Growing Nuts in the North eBook

Growing Nuts in the North by Carl L. Weschcke

The following sections of this BookRags Literature Study Guide is offprint from Gale's For Students Series: Presenting Analysis, Context, and Criticism on Commonly Studied Works: Introduction, Author Biography, Plot Summary, Characters, Themes, Style, Historical Context, Critical Overview, Criticism and Critical Essays, Media Adaptations, Topics for Further Study, Compare & Contrast, What Do I Read Next?, For Further Study, and Sources.

The following sections, if they exist, are offprint from Beacham's Encyclopedia of Popular Fiction: "Social Concerns", "Thematic Overview", "Techniques", "Literary Precedents", "Key Questions", "Related Titles", "Adaptations", "Related Web Sites".

The following sections, if they exist, are offprint from Beacham's Guide to Literature for Young Adults: "About the Author", "Overview", "Setting", "Literary Qualities", "Social Sensitivity", "Topics for Discussion", "Ideas for Reports and Papers".

Contents

Table of Contents

Table of Contents

Page 1

Introduction

Chapter 1

FIRST ENCOUNTERS

Almost everyone can remember from his youth, trips made to gather nuts. Those nuts may have been any of the various kinds distributed throughout the United States, such as the butternut, black walnut, beechnut, chestnut, hickory, hazel or pecan. I know that I can recall very well, when I was a child and visited my grandparents in New Ulm and St. Peter, in southern Minnesota, the abundance of butternuts, black walnuts and hazels to be found along the roads and especially along the Minnesota and Cottonwood river bottoms. Since such nut trees were not to be found near Springfield, where my parents lived, which was just a little too far west, I still associate my first and immature interest in this kind of horticulture with those youthful trips east.

The only way we children could distinguish between butternut and black walnut trees was by the fruit itself, either on the tree or shaken down. This is not surprising, however, since these trees are closely related, both belonging to the family *Juglans*. The black walnut is known as *Juglans nigra* and the butternut or white walnut as *Juglans cinera*. The similarity between the trees is so pronounced that the most experienced horticulturist may confuse them if he has only the trees in foliage as his guide. An experience I recently had is quite suggestive of this. I wished to buy some furniture in either black walnut or mahogany and I was hesitating between them. Noting my uncertainty, the salesman suggested a suite of French walnut. My curiosity and interest were immediately aroused. I had not only been raising many kinds of walnut trees, but I had also run through my own sawmill, logs of walnut and butternut. I felt that I knew the various species of walnut very thoroughly. So I suggested to him:

Page 2

“You must mean Circassian or English walnut, which is the same thing. It grows abundantly in France. You are wrong in calling it French walnut, though, because there is no such species.”

He indignantly rejected the name I gave it, and insisted that it was genuine French walnut.

“Perhaps,” I advised him, “that is a trade name to cover the real origin, just as plucked muskrat is termed Hudson seal.”

That, too, he denied. We were both insistent. I was sure of my own knowledge and stubborn enough to want to prove him wrong. I pulled a drawer from the dresser of the “French walnut” suite and asked him to compare its weight with that of a similar drawer from a black walnut suite nearby. Black walnut weighs forty pounds per cubic foot, while butternut weighs only twenty-five. He was forced to admit the difference and finally allowed my assertion to stand that “French walnut” was butternut, stained and finished to simulate black walnut. Since it would have been illegal to claim that it was black walnut, the attractive but meaningless label of “French walnut” had been applied. Although it is less expensive, I do not mean to imply that butternut is not an excellent wood for constructing furniture. It ranks high in quality and is probably as durable as black walnut. I do say, though, that it was necessary for me to know both the species names and the relative weights of each wood to be able to distinguish between them indisputably.

An instance in which the nuts themselves were useless for purposes of identification occurred when I sent some black walnuts to the Division of Pomology at Washington, D. C. These were the Ohio variety which I had grafted on butternut roots. The tree had been bearing for three or four years but this was the first year the nuts had matured. During their bearing period, these black walnuts had gradually changed in appearance, becoming elongated and very deeply and sharply corrugated like butternuts although they still retained the black walnut flavor. Because of this mixture of characteristics, the government experts had great difficulty in identifying the variety, although the Ohio was well known to them.

Another variety of black walnut, the Thomas, I have also known to be influenced by the butternut stock on which it was grafted, when in 1938, one of my trees bore black walnuts whose meat had lost its characteristic flavor and assumed that of the butternut.

[Illustration: *A—Genuine original Ohio Black Walnut from parent tree*

B—Nut produced by grafting Ohio on Butternut]

Page 3

I also liked to pick hazelnuts when I was a boy. These are probably the least interesting among the wild nuts since they are usually small and hard to crack. There is much variation in wild hazels, however, and many people may recall them as being reasonably large. One of the two species abundant in Minnesota, *Corylus cornuta* or Beak hazel, has fine, needle-like hairs on its husk which are sure to stick into one's fingers disagreeably. When the husk is removed, *Corylus cornuta* resembles a small acorn. It does not produce in southern Minnesota and central Wisconsin as well as the common hazel, *Corylus Americana*, does, nor is its flavor as pleasing to most people. It is lighter in color than the common hazel and has a thinner shell. Of course, some hazels are intermediate or natural hybrids between these two species, and if the nuts of such hybrids are planted, they generally revert to one of the parents when mature enough to bear. This natural hybridization occurs among all plants, between those of the same species, the same genera or the same family. It is very rare between plants of different families. The process is a very important one in horticulture and I shall explain some of the crosses which are well-known later in this book.

Chapter 2

FIRST ATTEMPTS

When I was about fifteen years old, my family moved to St. Paul, Minnesota, where my home now is and where my experimental work with nuts was begun. St. Paul is in the 45th north parallel, but although it is farther north, it is as favorable for the growth of nut trees as New Ulm or St. Peter, because it lies in the Mississippi River valley and is farther east. Bodies of water and altitudes have as great an influence on plant life as latitude; at least, they can have, and these are factors that must be understood thoroughly. Soil conditions also vitally affect plant life, particularly deep-rooted trees such as nut trees usually are. Each has its own requirements; hickory, Japanese heartnut and Persian walnuts favor an alkaline soil, which chestnuts, wanting acid will not grow in; chestnuts thrive best in a slightly acid, well-drained soil; hazels will grow in either alkaline or acid soil as will black walnuts and butternuts; almonds need a light sandy soil, similar to that suitable to plums, pecans do well in either rich river bottoms, which may be slightly acid, or in clay soil on high hillsides which are alkaline. A deep, sandy or graveltype soil is usually accepted by the chestnuts even though it may not be slightly acid, and successful orchards have been grown on a deep clay soil on hillsides.

It is not always easy to obtain black walnuts and butternuts to eat. Hickory nuts have been a favorite of mine since I first tasted them and I often have found it difficult to procure fresh ones, ones that were not slightly rancid. Because I liked eating these nuts, I thought I would try to grow some for my own consumption and so avoid having to depend on a grocer's occasional supply of those shipped in, always a little stale. Raising nuts appealed to me economically too, since obviously trees would need little

care, and after they had begun to bear would supply nuts that could be sold at interesting prices.

Page 4

I turned the back yard of my home in St. Paul into an experimental plot. Here I set out some of each kind of tree I planted or grafted at my farm in Wisconsin. I had purchased a farm 35 miles east of St. Paul, beyond the influence of the St. Croix River Valley. My experiments really began there. The farm was covered with butternut trees, hazel bushes, and a wild hickory called “bitternut.” This last is well-named for I have never found an animal other than a squirrel that could endure its nuts. Possibly the white-footed mouse or deer-mouse could—I don’t know. He usually eats anything a squirrel does. I learned to appreciate these bitternut trees later and they became a source of experience and interest to me as I learned to graft on them many varieties, species and hybrids of hickory. They served as a root-system and shortened the length of time required to test dozens of hickory types, helping me in that way, to learn within one lifetime what types of nuts are practical for growing in the north.

Remembering the nut trees in southern Minnesota, I first thought to procure black walnut and hickory trees from some farmer in that district. Through acquaintances in St. Peter, I did locate some black walnut trees only to find that it was impractical to dig and transport trees of the size I wanted. A nursery near St. Paul supplied me with some and I bought twenty-eight large, seedling black walnut trees. I was too eager to get ahead with my plans and I attempted, the first year these trees were planted, to graft all of them. My ability to do this was not equal to my ambition though, and all but two of the trees were killed. I was successful in grafting one of them to a Stabler black walnut; the other tree persisted so in throwing out its natural sprouts that I decided it should be allowed to continue doing so. That native seedling tree which I could not graft now furnishes me with bushels of walnuts each year which are planted for understocks. This is the name given to the root systems on which good varieties are grafted.

In an effort to replace these lost trees, I inquired at the University of Minnesota Farm and was given the addresses of several nurserymen who were then selling grafted nut trees. Their catalogues were so inviting that I decided it would be quite plausible to grow pecans and English walnuts at this latitude. So I neglected my native trees that year for the sake of more exotic ones. One year sufficed; the death of my whole planting of English walnuts and pecans turned me back to my original interest. My next order of trees included grafted black walnuts of four accepted varieties to be planted in orchard form—the Stabler, Thomas, Ohio and Ten Eyck.

Page 5

I ordered a few hickories at the same time but these eventually died. My experience with hickories was very discouraging since they were my favorite nuts and I had set my heart on growing some. I think I should have given up attempting them had not one dealer, J. F. Jones, urged that I buy just three more hickory trees of the Beaver variety. He gave me special instructions on how to prepare them against winter. I have always felt that what he told me was indeed special and very valuable since those three trees lived. Subsequently, I bought several hundred dollars worth of trees from him. More than that, we became friends. I visited him at his nurseries in Lancaster, Pennsylvania, and he again demonstrated his interest and generosity by giving me both horticultural information and the kindest hospitality. My friendship with him was but one of many that I have formed while traveling and corresponding in the interests of nut culture. True and lasting friends such men make, too, with no circumstances of selfish import to taint the pleasure of the relationship.

Since I wanted to have many black walnut trees some day, I decided to plant ten bushels of black walnuts in rows. I thought I could later graft these myself and save expense. The theory was all right but when I came to practice it, I found I had not taken squirrels into consideration. These bushy-tailed rats dug up one complete bed which contained two bushels of nuts and reburied them in haphazard places around the farm. When the nuts started to sprout, they came up in the fields, in the gardens, and on the lawn—everywhere except where I had intended them to be. I later was grateful to those squirrels, though, because, through their redistributing these nuts I learned a great deal about the effect of soil on black walnut trees, even discovering that what I thought to be suitable was not. The trees which the squirrels planted for me are now large and lend themselves to experimental grafting. On them I have proved, and am still proving, new varieties of the English walnut.

The other eight bushels had been planted near a roadside and close to some farm buildings. The constant human activity thereabouts probably made the squirrels less bold, for although they carried off at least a bushel of walnuts, about two thousand seedlings grew. I had planted these too close together and as the trees developed they became so crowded that many died. The remaining seedlings supplied me with root-stocks for experimental work which proved very valuable.

I have always suspected the squirrels of having been responsible for the fact that my first attempt to grow hickory seedlings was unsuccessful. I planted a quart of these nuts and not one plant came up. No doubt the squirrels dug them up as soon as I planted them and probably they enjoyed the flavor as much as I always have.

Page 6

In 1924 I ordered one hundred small beechnut trees, *Fagus ferruginea*, from the Sturgeon Bay Nurseries at Sturgeon Bay, Wisconsin. The company was very generous and sent me three hundred of them. I planted these trees in a heavy clay soil with limestone running near the surface. They grew well the first year, except that there was heavy mortality during cold weather. In working with these trees my lack of experience and horticultural knowledge was against me. They could not tolerate the soil and within three years they were all dead.

To give variety to the landscape at my farm, I planted several other kinds of trees. Among these were Kentucky coffee-trees which have beautiful bronze foliage in the spring and honey locusts. I planted five hundred Douglas fir but unfortunately, I put these deep in the woods among heavy timber where they were so shaded that only a few lived. Later, I moved the surviving fir trees into an open field where they still flourish. About two hundred fifty pines of mixed varieties—white, Norway and jack—that I planted in the woods, also died.

I decided, then, that evergreens might do better if they were planted from seeds. I followed instructions in James W. Toumey's "Seeding and Planting in the Practice of Forestry," in bed culture and spot seeding. In the latter one tears off the sod in favorable places and throws seed on the unprotected ground. In doing this, I ignored the natural requirements of forest practice which call for half-shade during the first two to three years of growth. Thousands of seedlings sprouted but they all died either from disease or from attacks by cows and sheep. One should never attempt to raise trees and stock in the same field.

Because of these misfortunes, I determined to study the growth of evergreens. I invested in such necessary equipment as frames and lath screening. Better equipped with both information and material, I grew thousands of evergreen trees. Among the varieties of pine were:

native White Pine —Pinus strobus
Norway pine —Pinus silvestrus
Mugho pine —Pinus pumila montana
sugar pine —Pinus Lambertiana
(not hardy in northern Wisconsin)
Swiss stone —Pinus cembra
(not hardy in northern Wisconsin)
Italian stone —Pinus pinea
(not hardy in northern Wisconsin)
pinon —Pinus edulis
(not hardy in northern Wisconsin)
bull pine —Pinus Jeffreyi (hardy)
jack pine —Pinus banksiana (very hardy)

limber pine —Pinus flexilis
(semi-hardy, a fine nut pine).

Many of the limber pines came into bearing about fifteen years after the seed was planted. At that age they varied in height from three to fifteen feet. One little three-foot tree had several large cones full of seed. Each tree varied in the quality and size of its seeds. Although it might be possible to graft the best varieties on young seedling stocks, in all the hundreds of grafts I have made on pine, I have been successful only once. I doubt that such a thing would ever be practical from a commercial standpoint unless some new method were discovered by which a larger percentage of successful grafts could be realized.

Page 7

I cultivated the Douglas fir, white, Norway, and Colorado blue varieties of spruce. Besides these, I planted balsam fir, red cedar, *Juniperus Virginiana*, and white cedar, *Arborvitae*. Practically all of these trees are still growing and many of them bear seed.

I wish to describe the limber pine, *Pinus flexilis*, for it is not only a good grower and quite hardy but it is also a very ornamental nut pine which grows to be a broad, stout-trunked tree 40 to 75 feet high. The young bark is pale grey or silver; the old bark is very dark, in square plates. The wood itself is light, soft and close-grained, having a color that varies from yellow to red. The needles, which are found in clusters of five, are slender, 1-1/2 to 3 inches long, and are dark green. They are shed during the fifth or sixth year. The buds of the tree are found bunched at the branch tips and are scaly and pointed. The limber pine has flowers like those of the white pine, except that they are rose-colored. Although the fruit is described as annual, I have found that, in this locality, it takes about fifteen months from the time the blossoms appear for it to reach maturity. That is, the fruit requires two seasons for growth, maturing its seeds the second September. The cones of the limber pine, which vary from three to seven inches in length, are purple, having thick rounded scales and being abruptly peaked at the apex. The seeds are wingless or have only very narrow wings around them.

With the idea of getting practical results sooner, since nut trees mature slowly, I interplanted my nut trees with varieties of apple, plum and cherry. Doing so also served to economize on ground, since ultimately nut trees require a great deal of space for best growth. Walnut trees, for example, should be set 40 to 60 feet apart in each direction.

[Illustration: *Pinus Flexilus nut seeds, Natural Size*]

I learned a variety of facts during these first years of trial and error. I discovered, for instance, that iron fence posts rust away in an acid soil; that one must use cedar or oak. Conversely, in alkaline soil, iron will last indefinitely, but that the nitrogenous bacteria will quickly rot wooden posts. I found that the secret of growing hickories successfully lies in giving them plenty of room, with no forest trees around to cut off their supply of sunlight and air. I learned that it is impractical to graft a large forest tree of butternut or hickory. Incidental to that, I learned that a branch of a butternut tree which looks large enough to support a man’s weight near the trunk, will not do so when the branch is green and alive, but that a dead branch of similar size will. Contrariwise, even a small green limb of a bitternut-hickory will bear my weight, but an old limb, though several inches thick, becomes so brittle after it is dead for several years that it will break under slight pressure. Fortunately, falls from trees do not usually result in serious injuries but I did acquire quite a few bruises learning these distinctions.

Page 8

There is always a natural mortality in planting trees, but in those first years, lacking badly-needed experience, I lost more than 75%. Nearly all of them started to grow but died during the first few winters. Those which survived were the start of a nursery filled with hardy trees which can endure the climate of the north. In looking back, I appreciate how fortunate I was in having sought and received advice from experienced nurserymen. Had I not done so, frequent failures would surely have discouraged me. As it was, the successes I did have were an incentive which made me persist and which left me with faith enough in an ultimate success to go on buying seeds and trees and to make greater and more varied experiments.

Chapter 3

BLACK WALNUTS

I have spent more of my time cultivating black walnuts than any other kind of nut tree and given more of my ground area over to them. Yet it was with no great amount of enthusiasm that I started working with these trees. Obviously there could be nothing new or extraordinary resulting from my planting trees of this species either on my farm or at my St. Paul home, since there already were mature, bearing black walnut trees at both places. It was only with the idea that they would be an attractive addition to the native butternut groves that I decided to plant some black walnut seedlings.

This did not prove feasible as I first attempted it. I had engaged a Mr. Miller at St. Peter to procure wild black walnut trees for me since they grew near that town. He was to dig these trees with as much of the root system included as possible and ship them to my farm. But the winter season came before this had been accomplished and both Mr. Miller and I, deciding the idea was not as practical as we had hoped it would be, abandoned it. Later that same autumn I found that a nursery just outside of St. Paul had several rows of overgrown black walnut trees which they would sell me quite reasonably. I bought them and sent instructions to the tenant at my farm to dig twenty-eight large holes in which to plant them. Packed in straw and burlap, the trees weighed about 500 pounds, I found. This was much too heavy and cumbersome to pack in my old touring car, so I hunted around for some sort of vehicle I could attach to my car as a trailer. In an old blacksmith shop, I came upon an antiquated pair of buggy wheels. They looked as though they were ready to fall apart but I decided that with repairs and by cautious driving, they might last out the trip of thirty-five miles. So I paid the blacksmith his asking price—twenty-five cents. The spokes rattled and the steel tires were ready to roll off their wooden rims but the axles were strong. My father-in-law and I puttered and pounded, strengthened and tightened, until we felt our semi-trailer was in good-enough order. It might have been, too, if the roads in the country hadn’t been rough

Page 9

and frozen so hard that they hammered on the solid, unresisting tires and spokes until, almost within sight of the farm, one wheel dismally collapsed. As the wheel broke, the trailer slid off the road into a ditch, so that it was necessary to send on to the farm for the plow horses to haul out the car, the trailer and the trees. The horses finished hauling the trees to that part of the farm where holes had been dug for them. I had told my tenant to dig large holes and large holes he had certainly dug! Most of them were big enough to bury one of the horses in. Such was my amateurish first endeavor.

It was not until December of that year, 1919, that the twenty-eight trees were finally planted. Although the ground was already somewhat frozen and the trees poorly planted as a result, most of them started to grow in the spring. They would probably be living now if I had not been too ambitious to convert them from seedlings into grafted varieties such as the Ohio, Thomas and Stabler, which I had learned of during a winter's study of available nut-culture lore. I obtained scionwood from J. F. Jones, part of which I put on these abused trees and the remainder of which I grafted on butternut trees. At that time, I must admit, I was much more interested in trying the actual work of grafting than I was in developing or even conceiving a methodical plan to be worked out over a period of years.

In order to facilitate my grafting work that spring, I pitched a tent in the woods and lived there for a week at a time, doing my own cooking and roughing it generally. Cows were being pastured in this part of the woods and they were very interested in my activities. If I were absent for a long time during the day, on my return I would find that noticeable damage had been done to my tent and food supplies by these curious cows. While preparing some scionwood inside the tent one day, I heard a cow approaching and picked up a heavy hickory club which I had for protection at night, intending to rush out and give the animal a proper lesson in minding its own business. The cow approached the tent from the side opposite the door and pushed solidly against the canvas with its nose and head. This so aggravated me that I jumped over to that part of the tent and gave the cow a hard whack over the nose with my hickory stick. It jumped away fast for such a big animal. This seemed to end all curiosity on the part of these cows and I was allowed to carry on my work in peace.

With beginner's luck, I succeeded with many of the butternut grafts, as well as with some of the grafts on the twenty-eight planted black walnuts. However, all of the grafted black walnut trees ultimately died with the exception of one grafted Stabler. This large tree was a monument of success for twenty years, bearing some nuts every year and maturing them, and in a good season, producing bushels of them. One other of these seedlings survived but as it would not accept any grafts, I finally let it live as nature intended.

Page 10

In 1921, I began ordering grafted black walnut trees, as well as grafted hickory trees from J. F. Jones, who had the largest and best known of the nurseries handling northern nut trees. Some of these grafted trees were also planted at my home in St. Paul, using the two locations as checks against each other. The site in St. Paul eventually proved unsatisfactory because of the gravelly soil and because the trees were too crowded. The varieties of black walnuts I first experimented with were the Thomas, Ohio, Stabler and Ten Eyck, which were planted by hundreds year after year. If I had not worked on this large scale there would be no reason for me to write about it today as the mortality of these black walnuts was so high that probably none would have lived to induce in me the ambition necessary to support a plan involving lengthy, systematic experimentation. Some of these early trees survive today, however, and although few in number, they have shown me that the experiment was a worthy one since it laid the foundation for results which came later. In fact, I feel that both the time and money I spent during that initial era of learning were investments in which valuable dividends of knowledge and development are still being paid.

In grafting black walnuts on butternut trees, I very foolishly attempted to work over a tree more than a foot in diameter and I did not succeed in getting a single graft to grow on it. Other younger trees, from three to six inches in diameter, I successfully grafted. Some of these are still living but clearly show the incompatibility of the two species when black walnut is grafted on butternut. The opposite combination of butternut on black walnut is very successful and produces nuts earlier and in greater abundance than butternut does when grafted on its own species.

The expense of buying trees by hundreds was so great that after a year I decided that I could very easily plant black walnuts to obtain the young trees needed as understocks. When they had grown large enough, I would graft them over myself. I wrote to my friend in St. Peter, Mr. E. E. Miller, and he told me where I could obtain walnuts by the bushel. Soon I was making trips to the countryside around St. Peter buying walnuts from the farmers there. I planted about five bushels of these at the River Falls farm and the rest, another two bushels, at St. Paul. Soon I had several thousand young walnut trees which all proved hardy to the winters.

When pruning the black walnut trees purchased from Mr. Jones for transplanting, I saved the tops and grafted them to the young trees with a fair degree of success. In a few years, I was using my own trees to fill up spaces left vacant by the mortality of the Pennsylvania-grown trees. I did not neglect seeding to provide stocks of the Eastern black walnut also, which is almost a different species from the local black walnut, but these seedling trees proved to be tender toward our winters and only a few survived.

Page 11

After they had grown into large trees, these few were grafted to English walnuts. The difference between the Eastern black walnut and the local native black walnut is quite apparent when the two trees are examined side by side. Even the type of fruit is different, although I do not know of any botanical authority who will confirm my theory that they are different species. They are probably to be considered as geographically distinct rather than as botanically different species.

For several years I continued to graft black walnuts on butternut trees with the intention of converting hundreds, perhaps thousands, of these wild trees over to prolific, cultured black walnuts. I did not realize my mistake in doing this until ten years had elapsed. I believed that since the tops were growing, the trees would shortly produce nuts. Today they are still growing, bigger and better, yet most of these grafted trees bear no nuts, having only a crop of leaves. A few nuts result from these grafts, however, and some of the trees bear a handful of nuts from tops of such size that one would expect the crops to be measured in bushels. The kind which bore the best was the Ohio variety. In another chapter, I shall relate parallel experience in hickory grafting which I carried on simultaneously with grafting of black walnut on butternut.

My first big disappointment in my black walnut orchard was when, in about 1930, having a fairly good crop of nuts, I unsuccessfully attempted to sell them to local stores. They were not interested in anything except walnut kernels and to them, a wild walnut kernel was the same as a cultivated one as long as it was highly-flavored. This so cooled my enthusiasm and hopes for a black walnut orchard that I ceased experimenting with them except to try out new varieties being discovered through nut contests carried on by the Northern Nut Growers' Association. The 1926 contest produced a number of black walnut possibilities, among them being such named varieties as the Rohwer, Paterson, Throp, Vandersloot, Pearl and Adams.

The neglected and over-grown walnut seedlings now began to serve a useful purpose in grafting the new varieties which I obtained for testing in this locality. These were propagated by obtaining scionwood from the originators of the variety and grafting it on these seedling trees. My technical knowledge had increased by this time to such an extent that I was usually certain of one-half of the grafts growing. The behavior of the Rohwer and Paterson in 1937 invited nursery propagation on a greater scale than did other better-known types, because of their qualities of hardiness and earlier-ripening.

Page 12

In the spring of 1937, these native seedlings were again offered to the spirit of propagation, when a large part of the scionwood of English walnuts I had imported from the Carpathian mountains of Poland was grafted on them. The success of my grafting in this instance was only about 1-1/2%, showing that something was decidedly wrong. Two conclusions were possible: Either the scionwood had been injured by transportation and the severe winter temperatures during January and February of 1937 during which they were stored, or incompatibility existed between the imported walnuts and our local ones. My conclusion now is that when these stocks are fifteen years old or more and are thrifty, they will support grafting of the Carpathian English walnuts much more successfully than they will in their first decade of growth. Results have shown that these local stocks will accept such grafts, however, and that crops of English walnuts will be produced. The fertility of the soil must be maintained carefully, since the English walnut top tends to overgrow its black walnut root-stock, and unless nutritional substance for the support of these tops is fed to the root-system, meager crops, if any, will result.

I might note in comparison to the 1-1/2% success I had in this grafting, that during the same season I put several hundred scions of these same English walnuts on the Eastern black walnut stocks without a single successful graft occurring.

In 1933 and 1934, many of these experimentally grafted walnuts, such as Vandersloot, Paterson, and Rohwer as well as others, were planted in orchard formation. In digging these trees, we took care to get all of the root possible and to take a ball of dirt with the root. In spite of these precautions, some of the trees died, not having sufficient vitality and root development to withstand transplantation. This was a result not only of the crowded condition under which the stocks had grown but also of the poor soil which had nourished them. The soil was heavy blue clay underlaid with limestone within two feet of the top of the ground. Enough trees were set out in orchard formation which are growing well and bearing annual crops, to give us the proof we need in drawing conclusions of superiority among these varieties.

Black walnuts will keep for several years if they are properly dried and then stored in a cool, but not too damp, place. Storing nuts in attics which are likely to become excessively hot in the summer time, causes rancidity sooner than any other method. Nuts keep very well in attics during the winter but they should be transferred to a basement during hot weather. If the basement is very damp, though, nuts will mould there. For general storage, without having to move them from one place to another for different seasons, nuts can be kept most practically in a barn or outside shed. The only precaution necessary under such circumstances is that they should be in a box or steel barrel to prevent squirrels and mice from feeding on them, since barns and sheds are easily accessible to these animals.

Page 13

The kernels of black walnuts need not be discolored if the hulls of the fresh nuts are removed as soon as the nuts are ripe. At my farm, we have done this with an ordinary corn-sheller. The nuts, having been hulled this way, are then soaked in water for a few hours to remove any excess coloring matter left on their shells, after which they are dried for several days out-of-doors, although not exposed to the sun since this might cause them to crack open. Thorough drying is necessary before sacking to prevent moulding. Kernels extracted from nuts treated this way are very light in color like English walnuts. This enhances their market value and they command a higher price when they are to be used for culinary purposes such as cake frosting and candies where there is exposure of large pieces or halves of the nut kernel. I find black walnuts are exceptionally delicious when used in a candy called divinity fudge. The strong flavor of the black walnut kernel although appreciated by many people, is not as popular as that of the butternut, of which more is said in another chapter.

The food value of black walnut kernels is high since they are composed of concentrated fat and protein, similar to the English walnut, the hickory nut and the pecan. There is also the advantage, which John Harvey Kellogg of Battle Creek, Michigan, has pointed out, that nuts are a food of high purity being entirely free from disease bacteria. One could safely say of unshelled nuts that there is not a disease germ in a carload.

There was a time when black walnut hulls were purchased by producers of insecticides. The black walnut hull, when dried and pulverized, produces a substance which gives body to the concentrated pyrethrum extract which is the essential ingredient of many insecticides.

One cannot leave a discussion of black walnuts without reflecting on the furniture which has been possible only through the use of vast forests of black walnut timber. Beautiful veneers have come from the burl walnut, being formed by protuberances on the trunks of the trees near the surface of the ground. There is a variety of black walnut which we have been experimenting with for quite a few years, called the Lamb, which has a beautifully figured grain. As this appears only in mature timber, ours is not yet old enough to show it.

I have found that the Ohio black walnut is prone to hybridize with butternut trees in its vicinity and others have told me of its hybridizing with English walnut trees near it, which shows it to be almost as vacillating in character as our Japanese walnuts or heartnuts. Ohio black walnuts, when planted, usually produce vigorous stocks, many of which show hybridity of some sort. If one examines the nuts of the Ohio and finds them dwarfed or deformed, he may be sure that they have been pollinized by something other than a black walnut. Planting such nuts, then, will grow hybrid trees. Most of us have enough curiosity to want to try this as an experiment.

Page 14

Thomas walnut seedlings have produced more thrifty trees than Ohio nuts have. However, the best understocks are those produced from seeds of native grown trees. It is well understood that rarely does a specific type such as the Ohio, Thomas or Stabler reproduce itself exactly from seeds. In raising black walnut seedlings, my experience has taught me that the nuts should be planted in the fall and not too deep, one to two inches below the surface being all the depth necessary. They may never sprout if they are four to six inches under ground. The black walnut tree is a glutton for food seemingly, it will use all the fertilizer that it is given although, no doubt, there is a practical limit. It must have plenty of food to produce successive crops of nuts, and barnyard manure is the safest and most practical kind to use. This can be put on as a heavy mulch around the trees but some of it should also be spaded into the ground. One must always remember that the feeding roots of a tree are at about the same circumference as the tips of the branches so that fertilizer put close to the trunk will do little good except in very young trees. Since 1936 we have been watching a small native walnut which came into bearing while in a nursery row. This tree bore such fine thin-shelled easy-to-crack nuts and lent itself so readily to being propagated by graftage and had so many other good characteristics that we have selected it as representative of the black walnut varieties for the north and have named it the Weschcke walnut and patented the variety. A list is here appended to show the order of hardiness and value based on our experience:

1—Weschcke—very hardy—excellent cracking and flavor

2—Paterson—very hardy—excellent cracking and flavor (originating in Iowa)

3—Rohwer—very hardy—good cracker (originating in Iowa)

4—Bayfield—very hardy—good cracker (originating in Northern Wisconsin)

5—Adams (Iowa)—fairly hardy—good cracker

6—Ohio—semi-hardy, excellent cracking and flavor (parent tree in Ohio)

7—Northwestern—a new, good hardy nut

8—Pearl—semi-hardy—good (from Iowa)

9—Vandersloot—semi-hardy—very large

10—Thomas—tender to our winters—otherwise very good (from Pennsylvania)

11—Stabler—tender—many nuts single-lobed

12—Throp—tender, many nuts single-lobed

A friend of mine, who lives in Mason, Wisconsin, discovered a black walnut tree growing in that vicinity. Since Mason is in the northern part of the state, about 47 deg. parallel north, this tree grows the farthest north of any large black walnut I know of. I would estimate its height at about sixty-five feet and its trunk diameter at about sixteen inches at breast-height. Because of the short growing season there, the nuts do not mature, being barely edible,

Page 15

due to their shrinkage while drying. Some seasons this failure to mature nuts also occurs in such varieties as the Thomas, the Ohio and even the Stabler at my River Falls farm, which is nearly 150 miles south of Mason. Such nuts will sprout, however, and seedlings were raised from the immature nuts of this northern tree. Incidentally these seedlings appear to be just as hardy in wood growth as their parent tree. I have also grafted scionwood from the original tree on black walnut stocks at my farm in order to determine more completely the quality of this variety. Since grafted, these trees have borne large, easy to crack mature nuts and are propagated under the varietal name (Bayfield) since the parent tree is in sight of Lake Superior at Bayfield, Wisconsin.

Many of our best nut trees, from man's point of view, have inherent faults such as the inability of the staminate bloom of the Weschcke hickory to produce any pollen whatsoever, as has been scientifically outlined in the treatise by Dr. McKay under the chapter on hickories. In the Weschcke walnut we have a peculiarity of a similar nature as it affects fruiting when the tree is not provided with other varieties to act as pollinators. It has been quite definitely established, by observation over a period of ten or more years, that the pollen of the Weschcke variety black walnut does not cause fruiting in its own pistillate blooms. Although this is not uncommon among some plants, such as the chestnut and the filbert where it is generally the rule instead of the exception, yet in the black walnuts species the pollen from its own male (or staminate) flowers is generally capable of exciting the ovule of the female (pistillate) flower into growth. Such species are known as self-fertile. As in the case of ordinary chestnuts which receive no cross pollination, and the pistillate flowers develop into perfect burrs with shrunken meatless, imperfect nuts, the Weschcke black walnut, when standing alone or when the prevailing winds prevent other nearby pollen from reaching any or but few of its pistillate bloom, goes on to produce fine looking average-sized nuts practically all of which are without seed or kernels. Such therefore is the importance of knowing the correct pollinators for each variety of nut tree. In the self-sterility of filberts the failure of self-pollination results in an absence of nuts or in very few rather than a full crop of seedless fruits such as the common chestnut and the Weschcke black walnuts produces. This is the only black walnut that has come to the author's attention where its pollen acting on its pistillate bloom has affected the production of nuts in just this way but the variety of black walnut known as the Ohio, one of the best sorts for this northern climate except for hardiness, has often demonstrated that it has a peculiarity which might be caused by lack of outside pollen or because of the action of its own pollen on its pistillate bloom. This peculiarity is the often found one-sided development of the Ohio walnut kernel when the tree is isolated from other pollen bearing black walnuts. One lobe of the kernel is therefore full-meated while the other half or lobe is very undernourished or it may be a thin wisp of a kernel as is the appearance of the Weschcke variety in similar circumstances.

Page 16

[Illustration: *Stabler variety of Black Walnut grafted on a Minnesota seedling stock bore many years but was winter killed. Photo by C. Weschcke*]

Cutting scionwood early one spring, I noticed that the sap was running very fast in the grafted Stabler tree previously referred to. Later when I came back to inspect this tree, I noticed that the sap had congealed to syrupy blobs at the ends of the cut branches. My curiosity led me to taste this and I found it very sweet and heavy. I mean to experiment some time in making syrup from the sap of this tree as I believe its sugar content to be much higher than that of the local sugar maple. This makes the Stabler a 3-purpose tree, the first being its nuts, the second being the syrup, and the third being, at the end of its potentially long life, a good-sized piece of timber of exceptionally high value. The tree is one of beauty, having drooping foliage similar to that of the weeping willow. This is another point in its favor, its being an ornamental tree worthy of any lawn. However, the Stabler is now considered as a tender variety and is not recommended for northern planting.

[Illustration: *Stabler graft on old seedling grafted in May, 1938 bearing in August of the same year. Photo by C. Weschcke*]

[Illustration: *Cut Leaf Black Walnut. Scions furnished by Harry Weber of Cincinnati, Ohio. Variety was hardy on Minnesota seedling for about 5 years. Photo by C. Weschcke*]

The aesthetic value of the black walnut does not cease here since there are some varieties which are exceptionally attractive. One of these is the cut-leaf black walnut which has the ordinary compound leaf but whose individual leaflets are so scalloped and serrated that they resemble a male fern. Everyone who has seen one of these has evinced pleasurable surprise at this new form of leaf and it may become very popular with horticulturists in the future. Another interestingly different variety is the Deming Purple walnut which, although orthodox in leaf form, has a purplish tint, bordering on red in some cases, coloring leaf, wood and nuts, resulting in a distinctly decorative tree. This tree was named for Dr. W. C. Deming who was the founder of the Northern Nut Growers' Association. Neither the Laceleaf nor Deming Purple are hardy for this climate but survived several years nevertheless before succumbing to one of our periodical test winters.

Chapter 4

HAZELS AND FILBERTS

In October 1921, I ordered from J. F. Jones, one hundred plants of what is known as the Rush hazel which was, at that time, the best known of the propagated hazels. In ordering these, I mentioned the fact that I expected to get layered plants or grafted

ones. Mr. Jones wrote me at once to say that the plants he had were seedlings of the Rush hazel which are said to come very true to seed, but that if I did not want them

Page 17

as seedlings he would cancel the order. Rather than lacking a profitable filler between the orchard trees, I accepted the order of one hundred plants and received from him a fine lot of hazels which took good root and began to grow luxuriantly. It was several years before any of them began to bear and when one or two did, the nuts were not hazels at all, but filberts and hybrids. In most cases these nuts were larger and better than those of the original Rush hazel.

One of these seedlings grew into a bushy tree ten or twelve feet high. For several years it bore a crop which, though meager, was composed of large, attractive nuts shaped like those of the common American hazel but very unlike the true Rush hazelnut. One year this tree began to fail and I tried to save it or propagate it by layering and sprouting seeds. Unfortunately it did not occur to me at that time to graft it to a wild hazel to perpetuate it. I still lament my oversight as the tree finally died and a very hardy plant was lost which was apparently able to fertilize its own blossoms.

I ordered four Winkler hazel bushes from Snyder Bros. of Center Point, Iowa, in March 1927, asking them to send me plants that were extra strong and of bearing size. I planted these that spring but the following summer was so dry that all four died. I ordered twelve more Winklers in September for spring delivery, requesting smaller ones this time (two to three feet). Half of these were shipped to me with bare roots, the others being balled in dirt for experimental purposes. Four of the latter are still living and producing nuts.

In April 1928, I planted a dozen Jones hybrid hazels but only two of them survived more than two years. I think the reason they lasted as well as they did was that around each plant I put a guard made of laths four feet high, bound together with wire and filled with forest leaves. I drove the laths several inches into the ground and covered them with window screening fastened down with tacks to keep mice out of the leaves. Although somewhat winter-killed, most of the plants lived during the first winter these guards were used. The second winter, more plants died, and I didn’t use the guards after that.

The two Jones hybrids that lived produced flowers of both sexes for several years but they did not set any nuts. One day while reading a report of one of the previous conventions of the Northern Nut Growers’ Association, I discovered an article by Conrad Vollertsen in which he stressed the importance of training filberts into a single truncated plant, allowing no root sprouts or suckers to spring up since such a condition prevents the bearing of nuts. I followed his advice with my two Jones hybrids and removed all surplus sprouts. This resulted in more abundant flowers and some abortive involucres but still no nuts developed. In the spring of 1940, I systematically fertilized numerous pistillate flowers of these plants with a pollen mixture. On the branches so treated, a fairly good crop of nuts similar to those of the orthodox Jones hybrid appeared.

Page 18

I had cut off a few branches from the Jones hybrids when I received them and grafted these to wild hazels. This had been suggested by Robert Morris in his book, “Nut Growing,” as an interesting experiment which might prove to be practical. It did not prove to be so for me for although the grafting itself was successful I found it tiresome to prune, repeatedly, the suckers which constantly spring up during the growing period and which are detrimental to grafts. Although they lived for five years, these grafts suffered a great deal of winter-injury and they never bore nuts. The one which lived for the longest time became quite large and overgrew the stock of the wild hazel. This same plant produced both staminate and pistillate blossoms very abundantly for several seasons but it did not set any nuts in spite of the many wild hazels growing nearby which gave it access to pollen. It is now known that this hybrid is self-sterile and must have pollinators of the right variety in order to bear.

My next work with members of the genus Corylus was discouraging. In April 1929, I bought one hundred hazel and filbert plants from Conrad Vollertsen of Rochester, New York, which included specimens of the Rush hazel and of the following varieties of filberts:

Italian Red
Merribrook
Kentish Cob
Early Globe
Zellernuts
White Lambert
Althaldensleben
Medium Long
Bony Bush
Large Globe
Minnas Zeller
Marveille de Bollwyller

Although many of these filberts bore nuts the first year they were planted, within two years they were all completely winter-killed.

In 1932, I received ten filbert bushes from J. U. Gellatly of West Bank, British Columbia. These consisted of several varieties of Glover’s best introductions and some Pearson seedlings. I planted them on the south side of a high stone wall, a favorable location for semi-hardy plants. They appeared to be thrifty and only slightly winter-killed during the first two years but by 1939, all but two of the bushes had died or were dying. Although as nut-bearing plants they have been of little value to me, their pollen has been of great service.

I found an unusually fine wild hazel growing in the woods on my farm and in 1934, I began an experiment in hybridizing it. I crossed the pistillate flowers of the native hazel

with pollen from a Gellatly filbert and obtained four hybrid plants, which I have called hazilberts. In the spring of 1940, three of these hybrids had pistillate flowers but no staminate blooms. As I was very eager to see what the new crosses would be like, I fertilized the blossoms with a gunshot mixture of pollen from other plants such as the Winkler hazel, the European filbert and the Jones hybrid hazel. Certain difficulties arose in making these hybrids, mainly due to the curiosity of the squirrels who liked to rip open the sacks covering the blossoms which

Page 19

were being treated. Deer mice, too, I found, have a habit of climbing the stems of hazel bushes and gnawing at the nuts long before they are mature enough to use for seed. Later I learned to protect hybrid nuts by lacing flat pieces of window screening over each branch, thus making a mouse-proof enclosure. Even after gathering the nuts I discovered that precautions were necessary to prevent rodents from reaching them. The best way I found to do this is to plant nuts in cages of galvanized hardware cloth of 2 by 2 mesh, countersunk in the ground one foot and covered completely by a frame of the same material reinforced with boards and laths.

The most interesting hazilbert that has developed bears nuts of outstanding size, typically filberts in every detail of appearance, although the plant itself looks more like a hazel, being bushy and having many suckers. After more testing, this hybrid may prove to be a definite asset to nursery culture in our cold northern climate, fulfilling as it does, all the requirements for such a plant. The second hazilbert resembles the first closely except that its nuts, which are also large, are shaped like those of Corylus Americana. The third hazilbert has smaller nuts but its shell is much thinner than that of either of the others.

In reference to the hazilberts, I am reminded of certain correspondence I once had with J. F. Jones. He had sent me samples of the Rush hazel and although I was impressed by them, I mentioned in replying to him that we had wild hazels growing in our pasture which were as large or larger than the Rush hazelnuts. I admitted that ours were usually very much infested with the hazel weevil. Mr. Jones was immediately interested in wild hazels of such size and asked me to send him samples of them. He wrote that he had never seen wild hazels with worms in them and would like to learn more about them. I sent him both good and wormy nuts from the wild hazel bush to which I had referred. He was so impressed by them that he wished me to dig up the plant and ship it to him, writing that he wished to cross it with filbert pollen as an experiment. I sent it as he asked but before he was able to make the cross he intended, his death occurred. Several years later, his daughter Mildred wrote to me about this hazel bush, asking if I knew where her father had planted it. Unfortunately I could give her no information about where, among his many experiments, this bush would be, so that the plant was lost sight of for a time. Later Miss Jones sent me nuts from a bush which she thought might be the one I had sent. I was glad to be able to identify those nuts as being, indeed, from that bush.

In the spring of 1939, I crossed the Winkler hazel with filbert pollen; the European hazel with Winkler pollen; the Gellatly filbert with Jones hybrid pollen. These crosses produced many plants which will be new and interesting types to watch and build from. I have already made certain discoveries about them. By close examination of about forty plants, I have been able to determine that at least five are definitely hybrids by the color, shape and size of their buds. This is a very strong indication of hybridity with wild

hazel or Winkler. On one of these plants, about one-foot high, I found staminate bloom which I consider unusual after only two seasons' growth.

Page 20

During the fall of 1941, I became interested in a phenomenon of fruit determination previous to actual fructification of the plant by detailed examinations of its buds. I noticed, for instance, that large buds generally meant that the plant would produce large nuts and small buds indicated small nuts to come. The color of the buds, whether they were green, bronze green or reddish brown, could be fairly well depended upon to indicate their hybridity in many cases. These tests were not wholly reliable but the percentage of indication was so high that I was tempted to make predictions.

At that time, hazilbert No. 1 had not borne nuts. The bush resembled a wild hazel so much that I had begun to doubt its hybridity. Upon examining its buds, I found indications in their color that it was a hybrid, although the nuts apparently would not be large. It would be an important plant to me only if its pollen should prove to be effective on the other hazilberts. At the time this was only a wishful hope, because the pollen of the wild hazel, which this plant resembles, apparently does not act to excite the ovules of either filberts or filbert hybrids with filbert characteristics. Pure filbert pollen seemed to be necessary. In 1942, its pollen did prove to be acceptable to the other hazilberts and my hope for a good pollinizer was realized in it.

From the conclusions I reached through my study of the buds, I made sketches of which I believed the nuts of No. 1 would be like in size and shape. In March 1942, these sketches were used as the basis of the drawing given here. A comparison of this drawing with the photograph taken in September 1942, of the actual nuts of hazilbert No. 1 show how accurate such a predetermination can be.

I am convinced from the work I have done and am still doing, that we are developing several varieties of hazilberts as hardy and adaptable to different soils as the pasture hazel is, yet having the thin shell and the size of a European filbert. As to the quality of the kernel of such a nut, that of the wild hazel is as delicious as anyone could desire.

[Illustration: *3/4 Natural size Filberts*]

[Illustration: *3/4 Natural size Hazilberts and Winkler Hazel*]

[Illustration: *31/32 of actual size Hazilberts. Left to right: No. 3, No. 5, No. 4, No. 2*]

[Illustration: *No. 1 Hazilbert about 9/15/42. Note almost identical size and shape of this actual photograph of No. 1 compared to predetermined size and shape in drawing made almost one year previous to photograph. Plant had not produced any nuts prior to crop of 1942*]

Chapter 5

HAZELS AND/OR FILBERTS

There is a certain amount of confusion in the minds of many people regarding the difference between filberts and hazels, both of which belong to the genus Corylus. Some think them identical and call them all hazels dividing them only into European and American types. I see no reason for doing this. “Filbert” is the name of one species of genus Corylus just as “English walnut” is the commercial name of one of the members of the Juglans family. There is as much difference between a well-developed filbert and a common wild hazelnut as there is between a cultivated English walnut and wild black walnut.

Page 21

For ordinary purposes the nuts sold commercially, whether imported or grown in this country, are called filberts while those nuts which may be found growing prolifically in woodlands and pastures over almost the whole United States but which are not to be found on the market are called hazelnuts. This lack of commercialization of hazelnuts should be recognized as due to the smallness of the nut and the thickness of its shell rather than to its lacking flavor. Its flavor, which seldom varies much regardless of size, shape or thickness of shell, is both rich and nutty. The three main food components of the hazelnut, carbohydrate, protein and oil, are balanced so well that they approach nearer than most other nuts the ideal food make-up essential to man. The English walnut contains much oil and protein while both chestnuts and acorns consist largely of carbohydrates.

One salient feature which definitely separates the species Corylus Americana or wild hazel, from others of its genus, is its resistance to hazel blight, a native fungus disease of which it is the host. Controversies may occur over the application of the names “hazel” and “filbert” but there is no dispute about the effect of this infection on members of genus Corylus imported from Europe. Although there is wide variety in appearance and quality within each of the species, especially among the European filberts, and although filberts may resemble hazels sufficiently to confuse even a horticulturist, the action of this fungus is so specific that it divides Corylus definitely into two species. Corylus Americana and Corylus cornuta, through long association, have become comparatively immune to its effects and quickly wall off infected areas while filbert plants are soon killed by contact with it. Hybrids between filberts and hazels will usually be found to retain some of the resistance of the hazel parent.

The ideal nut of genus Corylus should combine qualities of both hazels and filberts. Such a hybrid should have the bushy characteristics of the American hazel with its blight-resisting properties and its ability to reproduce itself by stolons or sucker-growth. It should bear fruit having the size, general shape, cracking qualities and good flavor of the filbert as popularly known. The hybrids I am growing at my farm, which I call “hazilberts” and which are discussed later, seem to fulfill these requirements. The plants may be grown as bushes or small trees. They are blight-resistant and their nuts are like filberts in appearance. Three varieties of these hazilberts have ivory-colored kernels which are practically free of pellicle or fibre. They have a good flavor.

A comparison of the ripening habits and the effect of frost on the various members of the genus Corylus growing in my nursery in the fall of 1940, is shown by these extracts taken from daily records of the work done there. It should be noted that the summer season that year was rainy and not as hot as usual, so that most nuts ripened two to three weeks later than they normally do.

Page 22

> "September 7 and 8: Wild hazels ripe and picked at this time. (Their kernels showed no shrinkage by October 25.)

September 14 and 15: I picked ripe nuts from hazilbert No. 5 which seems to be the first to ripen. Also picked half of the European filberts. (There was slight shrinkage in the kernels of the latter a few weeks later showing that they could have stayed on the trees another week to advantage.)

> All of the nuts of a Jones hybrid, which is a cross between Rush and some European variety such as Italian Red, could have been picked as they were ripe. Some were picked.

The almond-shaped filbert classified as the White Aveline type, was not quite ripe; neither were hazilberts No. 2 and No. 4, nor the Gellatly filberts. Wild hazelnuts at this time had dry husks and were falling off the bushes or being cut down by mice.

> September 21 and 22: The remaining European filberts of the imported plants were picked. Also, I picked half of the White Aveline type nuts.

[Illustration: *Carlola Hazilberts No. 5, about 8/10/42. This is the earliest ripening and thinnest shell of the large type hazilberts, not the largest size however. Carlola Weschcke shown in picture. Photo by C. Weschcke*]September 28 and 29: We picked most of the nuts remaining on hazilbert No. 5 and the remainder of the White Aveline type. At this time we record a heavy frost which occurred during the previous week, that is, between September 22 and 28th. Since it froze water it was considered a "killing" frost. However, the damage was spotty all over the orchard, most things continuing to develop and ripen. Winkler hazels picked and examined at this time showed them far from ripe. Hazilberts growing next to limestone walls on the south side showed no signs of frost damage whereas the Winkler, on higher ground, showed severe damage to the leaves and the husks of the nuts which immediately started to turn brown. Leaves of other filbert plants in the vicinity showed no frost damage and the very few nuts that had been left on, such as those of the Jones hybrid, were undamaged.

> October 5 and 6: Picked all of hazilbert No. 2 except the last two nuts.
>
> Gellatly filberts were picked about October 10 and were ripe at that time.

October 11 to 13: Two English walnuts were picked and found to be as ripe as they would get. These as well as the black walnuts showed distinct signs of lacking summer heat needed for their proper development. The last two nuts on hazilbert No. 2 and the only nut on hazilbert No. 4 were picked at this time and were ripe. Chestnut burrs had

opened up and the nuts enclosed were fully mature.October 19 and 20: I found the last of the Winkler hazelnuts had been picked

Page 23

during the previous week, approximately October 14. These were left the longest on the bush of any hazel and still were not ripe although they were not entirely killed by the several frosts occurring before that time. They are always much later than the wild hazel."

On October 20, I had an opportunity of comparing the action of frost on the leaves of these plants. Those of the White Aveline type had not changed color and were very green. The leaves of the Jones hybrid showed some coloration but nothing to compare with those of the Winkler hazel, many of which had the most beautiful colors of any of the trees on the farm—red, orange and yellow bronze. Hazilbert No. 1, which resembles a wild hazel in appearance and habits of growth, had colored much earlier in reaction to the frost and was as brightly tinted as the wild hazel and Winkler plants except that, like the wild hazel, it had already lost much of its foliage. Some of the wild hazels were entirely devoid of leaves at this time. Hazilbert No. 5 showed the best color effects with No. 4 second and No. 2 last.

The color of the leaves and the action of the frost on the plants during the autumn is another thing, in my opinion, that helps to differentiate between and to classify European filberts, American hazels and their hybrids. My conclusion in regard to the effect of frost is that the reaction of the Winkler hazel is very similar to that of the wild hazel in color but exceeding it in beauty since its leaves do not drop as soon after coloring. At this time, the leaves had not changed color on the imported European plants, the Gellatly filberts from British Columbia or the White Aveline type. They had turned only slightly on the Jones hybrid. I think an accurate idea of the general hardiness of a plant is indicated by the effect of frost and by early dropping of leaves, using the sturdy wild hazel as the limit of hardiness and assuming that its hardiness is shown by both degree of coloration and early dropping of leaves.

In noting the action of frost on the Winkler hazel, I have mentioned that it was more like that on the American hazel than on the European filberts. The Winkler has always been considered a native woodland hazel, but, although it does show several similarities to Corylus Americana, I have also noticed certain qualities which definitely suggest some filbert heritage. I have based my theory on a study of the Winkler hazels which have been bearing annually at my farm for six years, bearing more regularly, in fact, than even the wild hazels growing nearby. My comparisons have been made with wild hazels in both Minnesota and Wisconsin and with European filberts.

Page 24

I found the first point of similarity with the filbert is in the involucre covering the nut. In the wild hazel, this folds against itself to one side of the nut, while in the filbert it is about balanced and if not already exposing a large part of the end of the nut, is easily opened. The involucre of the Winkler hazel is formed much more like that of the filbert than that of the hazel. In Corylus Americana this involucre is usually thick, tough and watery, while in the filbert it is thinner and drier, so that while a person may be deceived in the size of a hazelnut still in its husk, he can easily tell that of a filbert. This is also true of the Winkler whose involucre is fairly thick but outlines the form of the enclosed nut. Another feature about the involucre of the Winkler which classes it with the filberts rather than the hazels is in its appearance and texture, which is smooth and velvety while that of the hazel is hairy and wrinkled.

The staminate blooms of the Winkler hazel show similarity to those of both filberts and hazels. Sometimes they appear in formation at the ends of branches, much as those of the European filberts do, in overlapping groups of three or four. Again, they may be found at regular intervals at the axis of leaf stems very much as in the case of the American hazel. The buds on the Winkler hazel are dull red which is also true of those on the hybrid hazilberts, another indication of hybridity.

The initial growth of the embryo nut is very slow in the Winkler as it is in the filbert, as contrasted with the very rapid development of the native hazel embryo which matures in this latitude about one month ahead of the Winklers and some filberts. Although Winkler nuts are shaped like hazels and have the typically thick shells of hazelnuts, their size is more that of a filbert usually three times as large as a native hazel.

During the years between 1942 and 1945 many new hybrids between filberts and hazels were produced. Four wild varieties of hazels, which had unusual characteristics such as tremendous bearing and large size nuts and others having very early maturing or very thin shelled nuts were used as the female parents in making the crosses. Pollen was obtained from other parts of the U. S. or from filbert bushes which were growing on the place. Crosses included pollen of the Barcelona, Duchilly, Red Aveline, White Aveline, Purple Aveline, the Italian Red, Daviana and several hybrids between other filberts and hazels. By 1945 the number of these plants were in the neighborhood of 2000 and by 1952 considerable knowledge had been gained as to the hardiness, blight resistance to the common hazel blight (known scientifically as cryptosporella anomala), freedom from the curculio of the hazelnuts (commonly known as the hazel weevil) and resistance to other insect pests. Also, considerable data had been accumulated by cataloging over 650 trees each year for five years; cataloging included varied and

Page 25

detailed studies of their growth, bearing habits, ability to resist blight, curculio and other insects, the size of the nut, the thinness of the shell and the flavor of the kernel. Several books of all this detail were accumulated in trying to nail down several commercial varieties that would be propagated from this vast amount of material. Although some bushes produced good nuts at the rate of as much as two tons to the acre, measured on the basis of space that they took up in the test orchard, the most prolific kind seemed to be the ones that had a tendency to revert to the wild hazel type. The better and thinner-shelled types, more resembling the filberts, seemed to be shy bearers so that there being a host of new plants to catalog (more than 1000) which had not indicated their bearing characteristics, we included these among the possible ideal plants we were seeking. Although there were several plants that could be considered commercial in the original group of over 650 it has been thought that the waiting of a few more years to ascertain whether there would be something better in the next 1000 plants to bear that would be worthwhile waiting for and no attempt has been made to propagate the earlier tested plants. Some of these 650 tested hybrids proved to have nuts that were classed as Giants being much larger than the filberts produced by male or pollen parent such as the Barcelona, Duchilly or Daviana, and several times the size of the nuts of the female parent which was the wild hazel.

[Illustration: *Wild Wisconsin Hazel discovered on Hazel Hills Farm near River Falls. Note size of nuts in husks as compared to woman's hand. This plant became the female parent in over 1,000 crosses by pollen furnished from male blooms of Duchilly, Barcelona, Italian Red, White, Red, and Purple Aveline and many other well known filberts. Photo by C. Weschcke*]

Chapter 6

PECANS AND THEIR HYBRIDS

At the same time, October 1924, that I purchased Beaver hickory trees from J. F. Jones, I also procured from him three specimens each of three commercial varieties of pecan trees, the Posey, Indiana and Niblack, as well as some hiccan trees, *i.e*., hybrids having pecan and hickory parents. Only one tree survived, a Niblack pecan, which, after sixteen years, was only about eighteen inches in height. Its annual growth was very slight and it was killed back during the winter almost the full amount of the year's growth. In the 17th year this tree was dead.

In September 1925, at a convention of the Northern Nut Growers' Association in St. Louis, Missouri, I became acquainted with a man whose experience in the nut-growing industry was wide and who knew a great deal about the types of hickory and pecan trees in Iowa. He was S. W. Snyder of Center Point, Iowa. (He later became president

of the Association.) In one of his letters to me the following summer, Mr. Snyder mentioned that there were wild pecan trees growing near Des Moines and Burlington. I decided I wanted to know more about them and at my request, he collected ten pounds of the nuts for me. I found they were the long type of pecan, small, but surprisingly thin-shelled and having a kernel of very high quality.

Page 26

I first planted these nuts in an open garden in St. Paul, but after a year I moved them to my farm, where I set them out in nursery rows in an open field. The soil there was a poor grade of clay, not really suited to nut trees, but even so, most of the ones still remaining there have made reasonably good growth. I used a commercial fertilizing compound around about half of these seedlings which greatly increased their rate of growth, although they became less hardy than the unfertilized ones. After five years, I transplanted a number of them to better soil, in orchard formation. Although I have only about fifty of the original three hundred seedlings, having lost the others mainly during droughts, these remaining ones have done very well. Some of these trees have been bearing small crops of nuts during the years 1947 to date. The most mature nuts of these were planted and to date I have 17 second generation pure pecan trees to testify as to the ability of the northern pecan to become acclimated.

I gave several of the original seedlings to friends who planted them in their gardens, where rich soil has stimulated them to grow at twice the rate of those on my farm. There were four individual pecan trees growing in or near St. Paul from my first planting, the largest being about 25 feet high with a caliber of five inches a foot above ground. Although this tree did not bear nuts I have used it as a source of scionwood for several years. These graftings, made on bitternut hickory stock, have been so successful that I am continuing their propagation at my nursery, having named this variety the Hope pecan, for Joseph N. Hope, the man who owns the parent tree and who takes such an interest in it.

[Illustration: *Shows the use of a zinc metal tag fastened by 16 or 18 gauge copper wire to branch of tree.*]

By the year 1950 the tree had such a straggly appearance, although still healthy and growing but being too shaded by large trees on the boulevard, that Mr. Hope caused it to be cut down. The variety is still growing at my farm, grafted on bitternut stocks and although blossoming it has never produced a nut up to this time.

Another tree given to Joseph Posch of the city of St. Paul, Minnesota, had made even better growth and was luxuriantly healthy and in bloom when it was cut down by the owner because the branches overhung the fence line into a neighbor’s yard. This was done in about 1950.

Another tree given to Mrs. Wm. Eldridge of St. Paul still flourishes and is quite large (in 1952 at breast height, 6 inches in diameter) but being in a dense shade, it has not borne any nuts.

The fourth tree, given to John E. Straus, the famous skate maker, presumably exists at his lake residence north of St. Paul. I have not seen it in the last seven or eight years.

Page 27

Although they are not as hardy as bitternut stocks, I have found the wild Iowa pecan seedlings satisfactory for grafting after five years' growth. I use them as an understock for grafting the Posey, Indiana and Major varieties of northern pecan and find them preferable to northern bitternut stocks with which the pecans are not compatible for long, as a rule, such a union resulting in a stunted tree which is easily winter-killed. Although the Posey continued to live for several years our severe winters finally put an end to all these fine pecans. The root system of the seedling understock continued to live, however.

I chanced to discover an interesting thing in the fall of 1941 which suggests something new in pecan propagation. There were two small pecans growing in the same rows as the large ones planted fifteen years previously. When I noticed them, I thought they were some of this same planting and that they had been injured or frozen back to such an extent that they were mere sprouts again, for this has happened. I decided to move them and asked one of the men on the farm to dig them up. When he had dug the first, I was surprised to find that this was a sprout from the main tap root of a large pecan tree which had been taken out and transplanted. The same was true of the second one, except that in this case we found three tap roots, the two outside ones both having shoots which were showing above the ground. Another remarkable circumstance about this was that these tap roots had been cut off twenty inches below the surface of the ground and the sprouts had to come all that distance to start new trees. All of this suggests the possibility of pecan propagation by root cuttings. These two pecans, at least, show a natural tendency to do this and I have marked them for further experimentation along such lines.

On the advice of the late Harry Weber of Cincinnati, Ohio, an eminent nut culturist, who, after visiting my nursery in 1938, became very anxious to try out some of the Indiana varieties of pecans in our northern climate, I wrote to J. Ford Wilkinson, a noted propagator of nut trees at Rockport, Indiana, suggesting that he make some experimental graftings at my farm. Both Mr. Wilkinson and Mr. Weber gathered scionwood from all the black walnut, pecan, hiccan and hickory trees at their disposal, for this trial. There was enough of it to keep three of us busy for a week grafting it on large trees. Our equipment was carried on a two-wheeled trailer attached to a Diesel-powered tractor, and we were saved the trouble of having to carry personally, scions, packing material, wax pots, knives, pruning shears, tying material, canvas and ladders into the woods. Mr. Wilkinson remarked, on starting out, that in the interests of experimental grafting, he had travelled on foot, on horseback, by mule team and in rowboats, but that this was his first experience with a tractor.

Page 28

When he saw the type of grafting with which I had been getting good results, Mr. Wilkinson was astounded. He declared that using a side-slot graft in the South resulted in 100% failure, while I had more than 50% success with it. He was willing to discard his type of grafting for mine, which was adequate for the work we were doing, but I wanted to check his grafting performance and urged him to continue with his own (an adaptation of the bark-slot graft to the end of a cut-off stub). We both used paper sacks to shade our grafts. Although results proved that my methods averaged a slightly higher percentage of successful graftings in this latitude and for the type of work we were doing, his would nonetheless be superior in working over trees larger than four inches in diameter and having no lateral branches up to eight feet above ground, at which height it is most convenient to cut off a large hickory preparatory to working on it.

In the late fall of that year, we cut scionwood of the season's growth and inverted large burlap bags stuffed with leaves over the grafts, the bags braced on the inside by laths to prevent their collapsing on the grafts. So we have perpetuated the following varieties:

Hickories: Cedar Rapids, Taylor, Barnes, Fairbanks.

Hiccans: McAlester, Bixby, Des Moines, Rockville, Burlington, Green Bay.

The Major and Posey pure pecans being incompatible on bitternut hickory roots were grafted on pecan stocks, but they proved to be tender to our winters and the varieties were finally lost.

[Illustration: *Largest planted pecan in World having a record. About 17 ft. circumference breast height, 125 ft. spread and 125 ft. height. Very small worthless pecans. Easton, Maryland. Photo by Reed 1927*]

Other experiments I have made with pecans include an attempt to grow Southern pecans from seed, but they seem to be no more hardy than an orange tree would be. It is certain that they are not at all suited to the climate of the 45th parallel. In 1938, I received from Dr. W. C. Deming of Connecticut, some very good nuts from a large pecan tree at Hartford, Connecticut. Of the twelve pecans I planted, only six sprouted, and of these, only one has survived up to this date and is now a small weak tree. Apparently, the seedlings of this Hartford pecan are not as hardy as those from Iowa.

[Illustration: *Iowa seedling Pecans. Tree planted in 1926 as seed. First crop October 29, 1953. 7/8 of actual size. Nuts were fully matured. Photo by C. Weschcke*]

Page 29

Of the hiccans, hybrids between hickory and pecan, there are several varieties, as I mentioned before. Of these, the McAlester is the most outstanding, its nuts measuring over three inches in circumference and about three inches long. Horticulturists believe that this hybrid is the result of a cross between a shell-bark hickory, which produces the largest nut of any hickory growing in the United States, and a large pecan. I have experimented a number of times with the McAlester and my conclusion is that it is not hardy enough to advocate its being grown in this climate. There are other hiccans hardier than it is, however, such as the Rockville, Burlington, Green Bay and Des Moines, and it is certain that the North is assured of hardy pecans and a few hardy hybrids, which, although they do not bear the choicest pecan nuts, make interesting and beautiful lawn trees. Indeed, as an ornamental tree, the pecan is superior to the native hickory in two definite ways: by its exceedingly long life, which may often reach over 150 years as contrasted with the average hickory span of 100 years, and by its greater size. One pecan tree I saw growing in Easton, Maryland, in 1927, for example, was then seventeen feet in circumference at breast-height, one hundred twenty-five feet in height and having a spread of one hundred fifty feet. The wood of the pecan is similar to that of the hickory in both toughness and specific gravity, although for practical purposes, such as being used for tool handles, the shagbark hickory is enough harder and tougher to make it the superior of the two.

I was pleasantly surprised on October 30, 1953 when a pecan seedling of the Iowa origin, which had not yet borne any nuts, showed a small crop. These nuts were fully matured and were of sufficient size so that they could be considered a valuable new variety of pecan nut for the North. A plate showing a few of these pecans illustrates, by means of a ruler, the actual size of these pecans, and the fact that they matured so well by October 30 indicates that in many seasons they may be relied upon to mature their crop. No other data has been acquired on this variety and we can only be thankful that we can expect it to do a little better in size as successive crops appear, which is the usual way of nut trees. Also, by fertilizing this tree we can expect bigger nuts, as is generally the case. The shell of this pecan is so thin that it can be easily cracked with the teeth, which I have done repeatedly, and although small is thinner-shelled than any standard pecan.

Chapter 7

HICKORY THE KING

The acknowledged autocrat of all the native nuts is the hickory. Perhaps not all the experts admit this leadership but it is certainly the opinion held by most people. Of course, when I speak of the hickory nut in this high regard, I refer to the shagbark hickory which, as a wild tree, is native as far north as the 43rd parallel in Minnesota and Wisconsin, and somewhat farther in the eastern states.

Page 30

Wild hickory nuts have been commercialized only to a slight extent. Its crops are almost entirely consumed in the locality in which they are grown by those people who find great pleasure in spending fine autumn days gathering them. The obvious reason why hickory nuts have not been made a product of commerce lies in the nut itself, which is usually very small and which has a shell so strong and thick that the kernel can be taken out only in small pieces. The toughness of the shell makes cracking difficult, too, and since only rarely is one found that can be broken by a hand cracker, it is necessary to use the flatiron-and-hammer method. It is quite possible, though, that some day the hickory will rival or exceed its near relative, the wild pecan, in commercial favor. The wild pecans which formerly came on the market at Christmastime in mixtures of nuts were just as difficult to extract from their shells as the wild shagbark hickory nuts are now. By means of selection and cultivation, the pecan was changed from a small, hard-to-crack nut to that of a large thin-shelled nut whose kernel was extractable in whole halves. Among many thousands of wild pecan trees were a few which bore exceptionally fine nuts, nuts similar to those now found at every grocery store and called “papershell” pecans. These unusual nuts were propagated by grafting twigs from their parent trees on ordinary wild pecan trees whose own nuts were of less value. These grafted trees were set out in orchards where they produce the millions of pounds of high-grade pecans now on the market.

The question which naturally occurs is, “Why hasn’t this been done with hickory nuts?” Hundreds of attempts have been made to do so, by the greatest nut propagators in the United States. They have been successful in grafting outstanding varieties of hickory to wild root stocks but the time involved has prevented any practical or commercial success, since most grafted hickories require a period of growth from ten to twenty years before bearing any nuts. This length of time contrasts very unfavorably with that required by grafted pecans which produce nuts on quite young trees, frequently within three to five years after grafting. This factor of slow growth has set the pecan far ahead of the tasty shagbark hickory. Experimenters have long thought to reduce the time required by the hickory to reach maturity by grafting it to fast-growing hickory roots such as the bitternut or the closely related pecan. Both of these grow rapidly and the bitternut has the additional advantage of growing farther north and of being transplanted more easily. It has always been thought that when a good variety of shagbark hickory had been successfully grafted to bitternut root stocks, orchards of hickory trees would soon appear. This takes me to my discovery of the variety now known as the Weschcke hickory, which I have found fulfills the necessary conditions.

[Illustration: *Shows exceptionally thin shell of Weschcke hickory variety. Drawing by Wm. Kuehn*]

Page 31

One fall day in 1926, when I was at the home of a neighboring farmer, he offered me some mixed hickory nuts he had received from an uncle in Iowa. As he knew of my interest in nuts, he wanted my opinion of them. I looked them over and explained that they were no better than little nutmegs, having very hard shells and a small proportion of inaccessible meat. To demonstrate this, I cracked some between hammer and flatiron. My demonstration was conclusive until I hit one nut which almost melted under the force I was applying. The shape of this nut was enough different from the others to enable me to pick out a handful like it from the mixture. I was amazed to see how very thin-shelled and full of meat they were. Upon my request, this neighbor wrote to his uncle, John Bailey, of Fayette, Iowa, asking if he knew from which tree such fine nuts had come. Unfortunately he did not, because the nuts had been gathered from quite a large area. After corresponding with Mr. Bailey myself, I decided that I would go there and help him locate the tree, although it was nearly Christmas and heavy snowfalls which already covered the ground would make our search more difficult.

[Illustration: *Carl Weschcke, Jr., hand holding Weschcke hickory in hull. 9/15/42 Photo by C. Weschcke*]

On my arrival in Fayette, I called on Mr. Bailey, who was glad to help me hunt out the tree in which I had so much interest. We called A. C. Fobes, the owner of the farm from which the nuts were believed to have come, and arranged to go out there with him by bob sleigh. A rough ride of six or seven miles brought us to the farm and we began our quest. Once there, Mr. Bailey had a more definite idea of where to look for the tree from which these particular nuts came than he had had before and we had not been at our task for more than an hour before it was located. There were still quite a few nuts on the ground beneath it, which identified it accurately. It was a large shagbark whose first living branch was fully sixteen feet off the ground and, since we had no ladder with us, I had to shin up the tree to cut off some of the smaller branches. This shagbark, true to its name, had rough bark which tore not only my clothes but some of the skin on my legs as well and whereas the climbing up was difficult, the coming down was equally so. Having contracted verbally with Mr. Fobes to buy the tree, I packed the branches I had cut in cardboard boxes with straw packing and carefully brought them home to St. Paul.

I wrote at once to my friend, J. F. Jones, of my expedition, telling him of my plans to propagate this hickory. I also sent him some of the nuts from the parent tree and samples of extra-good nuts from other trees growing near it so that he could give me his opinion of them. Mr. Jones responded by advising me about the kind of a contract to make with Mr. Fobes in regard to both the purchasing and propagation of the original hickory tree and he urged the latter enthusiastically.

Page 32

Of the Weschcke hickory nuts themselves, he wrote: "This is practically identical with the Glover. The Glover is usually a little larger but this varies in all nuts from year to year. This is a fine nut and if it comes from Iowa, it ought to be propagated. I suggest you keep the stock of it and propagate the tree for northern planting, that is for Iowa, Minnesota, Wisconsin, *etc*., where most nuts grown here would not mature." A few years ago, I saw the Glover hickory nut for the first time and I also thought it much the same as the Weschcke in shape, as is also the Brill.

Because I did not know how to preserve the scions I had cut, they dried out during the winter to such an extent that they were worthless for spring grafting. This meant losing a whole season. The next fall I obtained more scionwood from Mr. Fobes and having kept it in good condition during the winter by storing it in a Harrington graft box shown by illustration, I was able to graft it in the spring. However, these grafts did not take hold well, only two or three branches resulting from all of it and these did not bear nor even grow as they should have. I was disappointed and discouraged, writing to Mr. Fobes that I did not believe the tree could be propagated.

[Illustration: *This drawing illustrates how to build a Harrington graft storage box*]

In the fall of 1932, Mr. Fobes sent me a large box of scions and branches, explaining that he had sold his farm and, as the tree might be cut down, this was my last opportunity to propagate it. Without much enthusiasm, I grafted the material he had sent me on about a dozen trees, some of them very large hickories and I was most agreeably surprised to find the grafting successful and more than one branch bearing nutlets. These nuts dropped off during the summer until only one remained to mature, which it did in the latter part of October. But I waited too long to pick that nut and some smart squirrel, which had probably been watching it ripen as diligently as I had, secured it first. I made a very thorough search of the ground nearby to find the remains of it, for while I knew I would not get a taste of the kernel—the squirrel would take care of that—I was interested in finding out whether it followed the exact shape and thinness of shell of the first nuts I had examined. I finally did find part of it, enough to see that it was similar to the nuts from the parent tree.

The grafts I made in 1932 have been bearing nuts every year since that time. The Weschcke hickory makes a tremendous growth grafted on bitternut hickory (Carya Cordiformis). The wood and buds are hardy to a temperature of 47 deg. below zero Fahrenheit, so that wherever the wild bitternut hickory grow, this grafted tree will survive to bear its thin-shelled nuts. The nuts have a fine flavor and the unusual quality of retaining this flavor without becoming rancid, for three years. The only fault to find with them

Page 33

is the commercial one of being only medium in size, so that compared to English walnuts, for example, they become unimpressive. I have noticed time and again that the average person will pass over a small, sweet nut to choose a larger one even though the latter may not have as attractive a flavor. This is noticeably true in regard to pecans, when the large paper-shell types, which have a rather dry, sweet kernel, are almost invariably preferred to the smaller ones of finer flavor, which are plump and have slightly thicker shells.

Previous to finding the Weschcke hickory, I experimented with several varieties of hickory hybrids. In March 1924, I purchased twelve Beaver and twelve Fairbanks hybrid hickories from J. F. Jones. I planted these trees in April of that year but of the lot, only two Beaver trees lived to bear nuts. One of these is still growing on my farm, in thin, clay soil underlaid with limestone, and it bears nuts annually. It is only a fair-sized tree but I think its slow growth has protected it from the usual amount of winter damage. I also ordered from Mr. Jones, in July 1924, 12 Marquardt hiccans, 12 Laney, 12 Siers, 34 Beaver and 30 Fairbanks. The last four are hybrids between species of hickories. Out of the whole order, amounting to one hundred trees, none remains alive now.

The Marquardt hiccan mentioned above was the subject of dispute among nut culturists for a time but it has been definitely agreed now, that the Marquardt was never actually propagated, the tree having been lost or cut down before scions were taken from it. Substitutes were taken from the Burlington, a hybrid whose nut is similar to the Marquardt and whose foliage and other attributes are thought to be like it. The name of Marquardt persisted for several years, however, and it has been entirely discarded only recently. The Burlington is now known to be the representative of that part of Iowa. However, I grafted some of the tops of the Marquardt trees from Jones to bitternut trees at the time that I transplanted them; several of the grafts made successful growth and resulted in several trees growing deep in the woods. After 28 years these grafts are still alive and certainly have established their right to be called compatible with bitternut hickory stocks. Close examination of the branches, leaves and buds, particularly the leaf-scars, indicate that this hiccan is enough different and more hardy than the Burlington, which also grows well on the bitternut, to discredit the story that the Marquardt is lost. It will not be determined, however, that this is the genuine Marquardt until it has fruited.

Page 34

Altogether I have grafted about 70 varieties of hickory and its hybrids on bitternut stocks in my attempts to increase the number of varieties of cultured hickory trees in the North. Most of those I worked with were compatible with the bitternut stock, but a few, perhaps a dozen, have indicated that they would rather not live on the bitternut and have died, either from incompatibility or winter-killing. Yet as a root system, the bitternut is the hardiest and easiest to transplant of any of the hickories and for these reasons it makes an ideal stock for the amateur nut-grower to use. I did try, in 1926, to grow some shagbark hickory stocks, which would be more compatible with those varieties I could not get started on bitternut. I planted half a bushel of shagbark hickory nuts from Iowa, but although they sprouted nicely, they were not sufficiently hardy and were winter-killed so severely that, after twelve years, the largest was not more than a foot high, nor thicker than a lead pencil. Some of these, about 50, were transplanted into the orchard and in other favorable locations. The largest of these, in 1952, is about 4 inches in diameter, 1-foot off the ground, and about 15 feet high. I have not grafted any yet and only one has borne any seedling nuts so far. I am now reconciled to using my native bitternut trees for most of my stock in spite of some disadvantages. A list of successfully grafted varieties is appended, and indicates to what extent this stock is a universal root stock for most of the hickories and their hybrids. A successful union, however, and long life, does not mean that good bearing habits will be established, since most of these trees grow in the woods in dense shade and poor surroundings. Some varieties have not borne many nuts, and some not at all. The following scions were cut this fall (in 1952) from successfully grafted trees deep in the woods:

Bixby hiccan	(pecan by shellbark)	grafted in 1938
Burlington hiccan	(pecan by shellbark)	grafted in 1938
Green Bay hiccan	(pecan by shellbark)	grafted in 1938
Des Moines hiccan	(pecan by shellbark)	grafted in 1938
Burton hiccan	(pecan by shellbark)	grafted in 1939
McAlester hiccan	(pecan by shellbark)	grafted in 1938
Anthony	Shagbark hickory	grafted in 1938
Barnes	Shagbark by mocker nut	grafted in 1938
Brill	Shagbark hickory	grafted in 1936
Brooks	Shagbark hickory	grafted in 1938
Camp No. 2	Shagbark hickory	grafted in 1938 (?)
Deveaux	Shagbark hickory	grafted in 1936
Fox	Shagbark hickory	grafted in 1939
Glover	Shagbark hickory	grafted in 1936
Gobble	Shagbark hickory	grafted in 1940
Hand	Shagbark hickory	grafted in 1939
Harman	Shagbark hickory	grafted in 1939

Page 35

Leonard	Shagbark hickory	grafted in 1939
Lingenfelter	Shagbark hickory	grafted in 1942
Manahan	Shagbark hickory	grafted in 1939
Milford	Shagbark hickory	grafted in 1939
Murdock	Shagbark hickory	grafted in 1941
Netking	Shagbark hickory	grafted in 1938
Platman	Shagbark hickory	grafted in 1938
Pleas	Pecan by bitternut	grafted in 1938
Schinnerling	Shagbark hickory	grafted in 1942
Stanley	Shellbark hickory	grafted in 1939
Swaim	Shagbark hickory	grafted in 1941
Taylor	Shagbark hickory	grafted in 1939
Triplett	Shagbark hickory	grafted in 1939
Woods		grafted in 1939

The varieties below are growing in orchard or random locations out of the woods:

Beaver	Hybrid hickory	grafted in 1924
Cedar Rapids	Shagbark hickory	grafted in 1926
Clark	Shagbark hickory	grafted in 1938
Fairbanks hybrid	Shagbark by bitternut	grafted in 1924
Herman Last	Hybrid	grafted in 1948
Hope pecan	Pure pecan grafted to bitternut	grafted in 1938
Kirtland	Shagbark hickory	grafted in 1936
Laney	Pecan by shellbark	grafted in 1936
Marquardt	Hiccan	grafted in 1924
Norton	Hiccan	grafted in 1938
River hickory	Undetermined hybrid	grafted in 1948
Rockville hiccan	Pecan by shellbark	grafted in 1926
Siers	Mockernut by bitternut	grafted in 1936
Stratford	Shagbark by bitternut	grafted in 1938
Weiker hybrid	Shagbark by shellbark	grafted in 1936

In addition to the above, several large and small trees of the Weschcke variety are located in orchard and random locations, some having been grafted in 1926 and later. Also, there is a sprinkling of Bridgewater variety, grafted in 1936 and later, all bearing each year.

For many years, I observed hickories and walnuts in bloom and hand-pollinated them, yet I overlooked many things I should have discovered earlier in study. It was only after ten years of observing the Weschcke hickory, for example, that I realized the importance of proper pollinization of it. In years when it produced only a few nuts, I had blamed seasonal factors, rains and soil conditions, but I now realize that it was due to lack of the right pollen. In the spring of 1941, I decided to make special pollen combinations with all the hickories then in bloom. The information I acquired in return was great reward for the work I did.

Page 36

I selected branches of the Weschcke hickory trees bearing a profuse amount of pistillate (female) blossoms. I hand-pollinated these with a special apparatus (the hand-pollen gun described later in this book), using a magnifying glass so that both pollen and blossom could be plainly seen. In doing this, I found it most practical to wear what jewelers call a “double loupe,” a light, fiber head-gear carrying lenses well-suited to such work. I treated the marked branches with pollen gathered from the Bridgewater, the Kirtland and the Beaver, all very good pollen-bearers. I also pollinated branches of the Cedar Rapids variety, which bears little pollen in this locality, with Kirtland pollen. However, the pollinization of the Cedar Rapids, which involved treating from 35 to 50 pistillate blossoms, resulted in only two mature nuts.

The Weschcke hickory has an abortive staminate bloom so that it must depend on some other variety for pollen. At the Northern Nut Growers’ Convention, held at Hershey, Pa. in 1941, (where I had the honor of being elected president of that venerable organization and succeeded myself thereafter for the next five years) I mentioned this abortive staminate bloom of my hickory to my friend, Dr. J. W. McKay, Associate Cytologist of the U. S. Department of Agriculture at that time. He was very interested in this phenomenon and wanted specimens of the abortive catkins for examination. These were sent to him in the spring of 1942. I quote from Dr. McKay’s report on his primary findings:

“I have just made a preliminary examination of the catkins from your hickory tree received last May, and it seems that the individual staminate flower of the catkin produces 4-5 undersized stamens, the anthers of which are devoid of either pollen or pollen-mother-cells. So far I have made only temporary preparations of the crushed anthers in stain but careful study of these mounts discloses no sign of pollen grains or mother cells, so we may tentatively conclude that no pollen is produced by the tree; in other words it is male-sterile. The stage at which degeneration of the pollen-forming tissue occurs in the anthers and its nature will have to be determined by means of a longer and more elaborate technique and I will let you know what we find as soon as the results are available. It may be that pollen-mother-cells are not even formed in the anthers; the small size of these structures and their more or less shriveled appearance lead me to believe that this may be the case.“So far as I know there is no instance among nut species comparable to that outlined above. We have two or three cases of male sterility in chestnut but in these no stamens are formed in the individual staminate flower. In one of the hybrid walnuts that I reported on at the Hershey convention, imperfect pollen grains are formed in the anthers but the latter structures never open, so no pollen is shed.

> “Bear in mind that the above report is preliminary and other
> angles may turn up when permanent mounts are available for study.”

Page 37

On December 14, 1943 I received a second, and final report from Dr. McKay from which I quote, as follows:

> "Dear Mr. Weschcke:

The enclosed pencil sketches will give you an idea of the results obtained from sectioning four lots of material from the two samples of catkins that you sent, two lots from each sample. Since the sample collected May 25 at the time of catkin fall was old enough to contain mature pollen and showed only anthers of the two types described herewith I think we may safely conclude that the tree is male sterile because of the failure of the mother cells to function. It is odd that in some anthers the pollen-mother-cells develop (type 2) while in others they do not (type 1). For this we have no explanation; nor can we explain why the tree is male sterile. I am afraid these phenomena will remain a matter of conjecture for some time to come. Since sterilities of this and other sorts in most other plants are largely genetic, that is, controlled by one or more genes that are inherited in Mendelian fashion, it is likely that such is the case here. You and I will not live long enough, however, to grow the necessary number of generations of trees to clear up these matters."In the course of routine preparation of other material I plan to run up other lots from your samples, and I will let you know if anything different turns up. I believe we may safely conclude, however, that the results reported herewith are representative."

In further explanation, Dr. McKay submitted the drawings shown on page 57, and says:

"Four lots of material were sectioned, two from the collection of May 6 and two from that of May 25. Of these, two gave anthers of type one, and two of type two. More material will have to be sectioned before we know which type is predominant.

> "The anthers of type one are greatly shriveled, and a band of deeply-staining collapsed cells apparently represents the remains of archesporial or pollen-forming tissue.

"The anthers of type two are normal in appearance, but the pollen-mother-cells degenerate before pollen grains are formed. A comparison of the degenerate pollen-mother-cells of this plant with normal pollen-mother-cells is given below:"

[Illustration: Sections of anthers of the Weschcke Hickory Carya ovata

Illustrations by Dr. McKay showing pollen degeneration in Weschcke hickory.]

This substantiates the conclusion that I had arrived at previous to this report, that this hickory is able to mature its nuts early in the fall by reason of not having to waste its energy in the production of pollen. (There is only one other variety of hickory which I have grafted on bitternut which has proved unable to mature pollen and it is the Creager

from Iowa.) I was immensely pleased to find that it responded very well to Bridgewater pollen, a high percentage

Page 38

of the blooms treated with it developing mature nuts. The results with the Kirtland pollen were almost equally good, the poorest showing coming from those branches treated with Beaver pollen on which only three mature nuts developed. (The Beaver is presumed to be a hybrid between bitternut and shagbark hickories.) Sixty-two nuts from these pollinizations were planted in the fall of 1941 in rodent-proof seed beds. In the spring, counting germination, I found 100% of these nuts had sprouted and grown into small trees during the season.

After finding the most suitable pollen for the Weschcke hickory, I realized the necessity for including more than one variety of hickory in a planting, just as there should be more than one variety of apple or plum tree in an orchard. I think that it would always be well to have three or more varieties of known compatibility within reasonable distances, probably not more than 100 feet apart, nor less than 40 to 50 feet for large hickories.

Of the many varieties of hickory and hickory hybrids I have tested, about twenty have, by now, proved to be sufficiently hardy to recommend for this latitude. These include:

Beaver hybrid hickory Fairbanks hybrid hickory *Laney hybrid hickory Burlington hybrid between pecan and shellbark hickory Rockville hybrid between pecan and shellbark hickory Hope pecan pure pecan grafted on to bitternut roots Hand pure shagbark* Bridgewater pure shagbark Barnes hybrid hickory *Cedar Rapids pure shagbark* Weschcke pure shagbark *Deveaux pure shagbark* Brill pure shagbark *Glover pure shagbark* Kirtland pure shagbark *Siers thought to be a hybrid between the mocker nut and bitternut*
Stratford hybrid (bitternut by shagbark) *Creager*

Have produced mature nuts

There are three or four others that are hardy but all means of identification having been lost, it will be necessary to wait until they come into bearing before their varieties will be known. As experiments continue, more varieties of worthy, hardy hickories and hiccans will be found which will justify completely the opinion of those of us who always hail as king of all our native nuts, the hickory.

[Illustration: *1930—Weschcke Hickory as borne by parent tree at Fayette, Iowa.*

1939—After several years of bearing grafted on Northern Bitternut hickory at River Falls, Wis.

1940—Still further change in shape and size from graft on Bitternut.

1941—Change and increase in size now is so pronounced as to almost extinguish its original identity.]

[Illustration: *Weschcke hickory nut natural size shows free splitting hull. Photo by C. Weschcke*.]

Page 39

Chapter 8

BUTTERNUT

Like the hickory tree, the butternut shares in the childhood reminiscences of those who have lived on farms or in the country where butternuts are a treat to look forward to each fall. The nuts, which mature early, have a rich, tender kernel of mild flavor. Only the disadvantage of their heavy, corrugated shells prevents them from holding the highest place in popularity, although a good variety cracks easily into whole half-kernels.

Butternuts grow over an extended range which makes them the most northern of all our native wild nut trees, although their nuts do not mature as far north as hazelnuts do. Butternut trees blossom so early that in northern latitudes the blossoms are frequently killed in late spring frosts. Only when the trees are growing near the summit of a steep hillside will they be likely to escape such frosts and bear crops regularly. I have found that really heavy crops appear in cycles in natural groves of butternut trees. My observation of them over a period of thirty-two years in their natural habitat in west-central Wisconsin has led me to conclude that one may expect butternut trees to bear, on an average, an enormous crop of nuts once in five years, a fairly large crop once in three years, with little or no crop the remaining years.

As a seedling tree of two or three years, the butternut is indistinguishable from the black walnut except to a very discerning and practiced eye, especially in the autumn after its leaves have fallen. As the trees grow older, the difference in their bark becomes more apparent, that of the butternut remaining smooth for many years, as contrasted to the bark on black walnut trees which begins to roughen on the main trunk early in its life. Bark on a butternut may still be smooth when the tree is ten years old. Forest seedlings of butternut, when one or two years old, are easily transplanted if the soil is congenial to their growth. Although the tree will do well on many types of soil, it prefers one having a limestone base, just as the English walnut does.

A butternut seedling usually requires several more years of growth than a black walnut does before it comes into bearing, although this varies with climate and soil. It is impossible to be exact, but I think I may safely say that it requires at least ten years of growing before a seedling butternut tree will bear any nuts. Of course, exceptions will occasionally occur.

As a butternut tree matures, it spreads out much like an apple or chestnut tree. Of course, it must have enough room to do so, an important factor in raising any nut tree. Enough room and sunlight hasten bearing-age and insure larger crops of finer nuts. Grafting valuable varieties of butternut on black walnut stock will also hasten bearing. I have had such grafts produce nuts the same year the grafting was done and these trees continued to grow

Page 40

rapidly and produce annually. However, they were not easy to graft, the stubborn reluctance of the butternut top to accept transplantation to a foreign stock being well known. This factor will probably always cause grafted butternut trees to be higher in price than black walnut or hickory. The reverse graft, *i.e*., black walnut on butternut should never be practiced for although successful, the black walnut overgrows the stock and results in an unproductive tree. Specimens 25 or more years old prove this to be a fact.

Butternut trees are good feeders. They respond well to cultivation and lend themselves to being grafted upon, although, from my own experience, I question their usefulness as a root stock. I have found that when I grafted black walnuts, English walnuts or heartnuts on butternut stock, the top or grafted part of the tree became barren except for an occasional handful of nuts, even on very large trees. Since this has occurred throughout the many years of my nut culture work, I think it should be given serious consideration before butternut is used as a root stock for other species of nut trees.

[Illustration: *Weschcke Butternut. Smooth shallow convolutions of shell allow kernels to drop out freely. Drawing by Wm. Kuehn.*]

I had the good luck to discover an easy-cracking variety of butternut in River Falls, Wisconsin, in 1934, which I have propagated commercially and which carries my name. A medium-sized nut, it has the requisite properties for giving it a varietal name, for it cracks mostly along the sutural lines and its internal structure is so shallow that the kernel will fall out if a half-shell is turned upside down. I received one of those surprises which sometimes occur when a tree is asexually propagated when I grafted scions from this butternut on black walnut stock. The resulting nuts were larger than those on the parent tree and their hulls peeled off with almost no effort. Whether these features continue after the trees become older is something I shall observe with interest.

[Illustration: *Self hulling Butternut. Weschcke variety. Drawing by Wm. Kuehn.*]

The nearly self-hulling quality of these nuts makes them very clean to handle. The absence of hulls in cracking butternuts not only does away with the messiness usually involved, but also it allows more accurate cracking and more sanitary handling of the kernels. In 1949 I noticed a new type of butternut growing near the farm residence. This butternut was fully twice as large as the Weschcke and had eight prominent ridges. The nut proved to be even better than the older variety and we intend to test it further by grafting it on butternuts and black walnut stocks. Although hand-operated nutcrackers have been devised to crack these and other wild nuts, they are not as fast as a hammer. If one protects the hand by wearing a glove and stands the butternut on a solid iron base, hitting the pointed end with a hammer, it is quite possible to accumulate a pint of clean nut meats in half an hour.

Page 41

The butternut tree is one whose lumber may be put to many uses. It is light but very tough and stringy and when planed and sanded, it absorbs varnish and finishes very well. Although not as dark in natural color as black walnut, butternut resembles it in grain. When butternut has been stained to represent black walnut, it is only by their weight that they can be distinguished. In late years, natural butternut has become popular as an interior finish and for furniture, being sold as “blonde walnut,” “French walnut,” or “white walnut,” in my opinion very improper names. I see no reason for calling it by other than its own. Depletion of forests of butternut trees brings its lumber value up in price nearly to that of fine maple or birch, approaching that of black walnut in some places.

I have run several thousand feet of butternut lumber from my farmland through my own sawmill and used it for a variety of purposes. It is probably the strongest wood for its weight except spruce. I have used it successfully to make propellers which operate electric generators for deriving power from the wind. Because butternut is so light and, properly varnished, resists weathering and decay to so great an extent, I have found it the best material I have ever tried for such construction. In building a small electric car for traveling around the orchards, I used butternut rather than oak or metal, which saved at least 100 pounds of weight, an important matter since the source of the car’s power is automobile storage batteries.

Butternut is very durable in contact with the ground and is used for fence posts on farms where it is plentiful. Bird houses built of this wood will last indefinitely, even a lifetime if they are protected with paint or varnish. Butternut is like red cedar in this respect, although much stronger. Stories have been told of black walnut logs which, after lying unused for fifty years, have been sawed into lumber and found to be still in excellent condition. It is quite likely that the same could be said of butternut for these woods are very much alike in the degree of their durability and resistance to weather.

An incidental value butternut trees have is their ability to bleed freely in the spring if the outer bark is cut. Therefore, they can be tapped like maple trees and their sap boiled down to make a sweet syrup. It does not have the sugar content that the Stabler black walnut has, however. Another possible use is suggested by the shells of butternuts which, even when buried in the ground, show great resistance to decay. I have found them to be still intact and possessing some strength after being covered by earth for fifteen years. This indicates that they might be used with a binder in a composition material. Their extreme hardness also offers a good wearing surface.

[Illustration: *Electrically operated wagon constructed of native butternut wood known for strength and light weight as well as durability. Author’s sons aboard. Photo by C. Weschcke 1941.*]

Page 42

Not only good things can be said of the butternut tree and it would be wrong to avoid mentioning the deleterious effect that a butternut tree may have on other trees planted within the radius of its root system. I have had several experiences of this kind. One butternut tree on my farm, having a trunk six inches in diameter, killed every Mugho pine within the radius of its root system. This amounted to between 50 and 100 pines. Their death could not be attributed to the shade cast by the butternut as Mugho pines are very tolerant of shade. As the first branches of the butternut were more than three feet off the ground, the pines could not have been influenced by the top system of the tree nor do I believe that it was due to fallen leaves, but rather directly to the greatly ramified roots. Large evergreens, such as Colorado blue spruce, native white pine, limber pine and Jeffrey pine are known to have been similarly influenced. While small butternut trees do not, in my experience, have this effect, this may be explained by the fact that the radius of their root systems is much more limited. Most plants, other than pines, thrive within the influence of butternut roots, however, and it certainly does not damage pasture grass as some of the country's best grazing land is among such trees. The damage results from a chemical known as Juglone which is elaborated by the root system and when the roots of the butternut cross those of its evergreen neighbor, this acts as a poison to the evergreen and may kill it.

[Illustration: *An 8-foot propeller of butternut wood is the prime mover for wind power generator which in a brisk wind generated 110 volts and 10 amperes at 300 RPM.*]

The butternut is attacked by one serious disease which is in the nature of a blight (melanconium oblongum), since it is transmitted through spores. It usually attacks old trees, the branches of the top part dying, and the bark on the main trunk becoming loose. The disease progresses slowly and I have seen large trees infected for twelve or fifteen years, continuing to bear fine crops. It does have a very weakening effect, though, and eventually saps the life from the tree long before its natural span of life of about fifty years is over.

Chapter 9

PIONEERING WITH ENGLISH WALNUTS IN WISCONSIN

The convention of the Northern Nut Growers' Association at Geneva, New York, in 1936, brought many interesting subjects to the attention of nut enthusiasts. None, however, commanded as much attention as an exhibit by Paul C. Crath, of Toronto, of walnuts from the Carpathian Mountains in Europe. There were more than forty varieties of walnuts represented in it, in sizes ranging from that of a large filbert to that of a very large hen's egg, and in shape being globular, ovate or rectangular. The exhibitor had these identified by varietal numbers until testing and propagation should suggest appropriate names.

Page 43

In several talks which Rev. Crath gave during the convention, he described his trips and findings in the walnut-producing sections of the Polish Carpathians. The subject remained in prominence during the three days of the convention and the idea was suggested that the Association sponsor another trip to Europe to obtain walnuts growing there which Rev. Crath considered even hardier and finer than the ones he had. The plan was tabled, however, for only two of us were eager to contribute to the venture.

On my return home, I thought more about what a splendid opportunity this would be to procure hardy English walnuts to grow in this part of the country. I interested my father in the idea, and, with his backing, corresponded with Rev. Crath. This was not the first or the last time that my father, Charles Weschcke, had encouraged me and had backed his good wishes and advice with money. A professional man and a graduate of pharmacy and chemistry of the University of Wisconsin, he showed an unusual interest in my horticultural endeavors. The immediate outcome was Rev. Crath's visit to my nursery at River Falls, to determine whether material that he might collect could be properly tested there. To my satisfaction, he found that temperature, soil conditions and stock material were adequate for such work.

We contracted with Rev. Crath to reproduce asexually all the varieties that he could discover and ship to us, agreeing to finance his trip and to pay him a royalty whenever we sold trees resulting from the plant material he sent us. We decided that the material which he was to gather should include not only English walnuts but also the hazels or filberts native to Poland. The walnuts were to consist of about six hundred pounds of seeds, representing some forty varieties, several thousand scions and about five hundred trees. We planned that the filberts should consist of both trees and nuts, but because of a total failure of this crop the year that Rev. Crath was there, only trees were available.

Rev. Crath left Canada in October 1936, and spent all of the following winter in Poland. While he was there, I began the task of arranging for the receipt of the walnuts and hazels he was to send, and so began a wearisome, exasperating experience. First, it was necessary to obtain permits from the Bureau of Plant Industry in Washington. Because of the vast quantity of material expected, these permits had to be issued in the names of five people. Next, I engaged a New York firm of importers, so that no time would be lost in re-routing the shipment to the proper authorities for inspection. This firm, in turn, hired brokers who were responsible for paying all duty, freight and inspection charges. I certainly thought that we had everything in such readiness that there would be nothing to delay the shipment when it arrived. How wrong I was!

Page 44

Although Rev. Crath had written me that the shipment had been sent on a certain Polish steamer, I learned of its arrival only from a letter I received from the importing company, which requested that the original bill of lading and invoice be sent to them at once, as the shipment had already been in the harbor for a week but could not be released by the customs office until they had these documents. I had received the bill of lading from Rev. Crath but not the invoice, for he had not known that I would need it. So my valuable, but perishable, shipment remained in port storage day after day while I frantically sought for some way to break through the “red tape” holding it there. Cables to Rev. Crath were undeliverable as he was back in the mountains seeking more material. In desperation, I wrote to Clarence A. Reed, an old friend, member of the Northern Nut Growers’ Association and in charge of government nut investigations in the Division of Pomology at Washington. Through his efforts and under heavy bond pending receipt of the invoice, the walnut and filbert material was released and sent to Washington, D. C. As there was too much of it to be inspected through the usual facilities for this work, it was necessary to employ a firm of seed and plant importers to do the necessary inspecting and fumigating. At last, terminating my concern and distress over the condition in which the trees and scions would be after such great delays and so many repackings, the shipment arrived in St. Paul. There remained only the requirement of getting permission from the Bureau of Plant Inspection of the State of Minnesota to take it to Wisconsin, where, if there was anything left, I intended to plant it. This permission being readily granted, we managed, by truck and, finally, by sled, to get it to the nursery about the middle of the winter.

The following spring, we planted the nuts and trees and grafted the scions on black walnut and butternut stocks. The mortality of these grafts was the greatest I have ever known. Of about four thousand English walnut grafts, representing some twenty varieties, only one hundred twenty-five took well enough to produce a good union with the stock and to grow. Some of them grew too fast and in spite of my precautions, were blown out; others died from winter injury the first year. By the following spring, there were only ten varieties which had withstood the rigor of the climate. Of the five hundred trees, only a few dozen survived. Fortunately, this was not one of our severe, “test” winters, or probably none of these plants would have withstood it.

The walnuts which were planted showed a fairly high degree of hardiness. Of 12,000 seedling trees, our nursery is testing more than 800 for varietal classification. These have been set out in test orchard formation on two locations, both high on the slope of a ravine, one group on the north side, one on the south. It has been suggested that from the remaining seedlings, which number thousands, we select 500 to 1000 representative specimens and propagate them on black walnut stocks in some warmer climate, either in Oregon, Missouri or New York. This would determine their value as semi-hardy trees worthy of propagation in such localities. Such an experiment will probably be made eventually.

Page 45

The same year, 1937, in which I obtained the Polish nuts, I also bought one hundred pounds of Austrian walnuts, to serve as a check. Eighty pounds of these consisted of the common, commercial type of walnut, while the remainder was of more expensive nuts having cream-colored shells and recommended by the Austrian seed firm as particularly hardy. Altogether these nuts included approximately one hundred varieties, twenty of which were so distinctive that their nuts could be separated from the others by size and shape.

About two thousand seedlings grew from this planting, most of which proved to be too tender for our winter conditions. The seedlings grown from the light-colored nuts show about the same degree of hardiness as the Carpathian plants. Many of them have been set out in experimental orchards to be brought into bearing.

After the first year, the English walnuts progressed fairly well. Large trees, which had not been entirely worked over at first, were trimmed so that nothing remained of the original top, but only the grafted branches. The winter of 1938-39 was not especially severe and mortality was low, although it was apparent that all of the varieties were not equally hardy. Even a few of the scions grafted on butternut stocks were growing successfully. I had made these grafts realizing that the stock was not a very satisfactory one, to learn if it could be used to produce scionwood. As the results were encouraging, I decided it would be worthwhile to give them good care and gradually to remove all of the butternut top.

Each fall, the first two years after I had grafted all these walnuts, I cut and stored enough scionwood from each variety to maintain it if the winter should be so severe as to destroy the grafts. Unfortunately, the grafts had developed so well, even to the actual bearing of nuts by three varieties, that in 1940 I did not think this precaution was necessary. Then came our catastrophic Armistice Day blizzard, the most severe test of hardiness and adaptability ever to occur in the north. Many of our hardiest trees suffered great injury from it, such trees, for instance, as Colorado blue spruce, limber pine, arborvitae; cultured varieties of hickories, hiccans, heartnuts; fruit trees, including apples, plums and apricots, which bore almost no fruit the next summer.

Although not one variety of English walnut was entirely killed, all, except one, suffered to some degree, and it was not until late the following summer that several varieties began to produce new wood. The variety which showed the greatest degree of hardiness is “Firstling,” originally known as Letter F. Although the primary buds on the Firstling were nearly all killed, very few of the small branches were affected and the union itself suffered no injury. Second in hardiness is Kremenetz, much of its top being killed, but its union being only slightly affected. No. 64 was affected in about the same amount as Kremenetz. Increasing degrees of tenderness and, of course, decreasing degrees of hardiness, were shown by the many other varieties, some of which may never recover completely from the shock of that blizzard. The seedling trees suffered only slight damage so that I expect that they are hardy enough to produce fruit here.

Page 46

I cannot conclude this chapter without mentioning certain observations I have made regarding hardiness, which, although they require more specific study, I wish to describe as a suggestion for further experimentation by either amateur or professional horticulturists. My theory is that a determination of the hardiness factor of an English walnut tree can be made according to the color of its bark. I have seen that a tree having thin bark which remains bright green late into the fall is very likely to be of a tender variety. Conversely, among these Carpathian walnuts, I have found that varieties whose bark becomes tan or brown early in autumn show much more hardiness than those whose bark remains green. One variety, Wolhynie, whose bark is chocolate brown, is very resistant to winter injury. Another, whose green bark is heavily dotted with lenticels, shows itself hardier than those having none or only a trace of them. In testing almonds, I have found that trees whose bark turns red early in the fall are definitely more hardy than those whose bark remains green or tan. In observing apricots, I have learned that young twigs with red bark are more resistant to cold than those with brown. Of course, these findings cannot be considered as facts until further studies have been made. I hope that others will find the idea of investigating this more-than-possibility as interesting as I do.

As the years increased, however, the growth of the seedling walnuts decreased and some having made a nice tree-like form, with a trunk of approximately an inch in diameter, within a succession of years were reduced in size through the combination of winter injury and attacks by the butternut curculio as well as a bacterial blight until by 1952 only a fraction of the 12,000 seedlings remained, certainly less than 1,000. All of the originally grafted specimens are dead with the exception of one variety which has been kept alive by constantly re-grafting it on black walnut. We have not named this variety as yet, although it has borne both staminate and pistillate bloom, it has never borne any ripe nuts. Some of the seedlings, however, still show persistent traits of hardiness and of insect resistance and we still have hopes that after 15 years these trees will yet overcome the adversities of this uncongenial climate for this species.

Chapter 10

OTHER TREES

Heartnut

The heartnut is a sport of the Japanese walnut (Juglans sieboldiana). Since its nut is heart-shaped, it has the name of “cordiformis” added to its species name. There are many of these sports, some of which have been propagated under the varietal names of Faust, Lancaster, Fodermaier, Wright, Walters, Canoka, Okay and Gellatly.

Page 47

I think this is the most ornamental of all nut trees. In shape, it is similar to an apple tree, spreading out rather than growing tall, but its long, compound leaves give it a tropical appearance. During the autumn these leaves do not color any more than do those of the black walnut. The tree produces long racemes of red blossoms and its staminate blooms are catkins eight to ten inches long, which, when fully ripened, swish in the wind and release clouds of yellow pollen. The heartnut tree holds the interest of its owner closely during that time when the nuts resulting from the racemes of blossoms are steadily increasing in size. I have seen as many as sixteen nuts on one stem and doubtless, there sometimes are more. The owner of such a tree, at least if he is at all like me, will proudly exhibit it to all comers during the spring and summer seasons. And then, at harvest time, after the nuts have gradually changed from green to the dull yellow that indicates their maturity, he will have the satisfaction of shaking them down for drying and storage.

The heartnut kernel tastes much like that of the butternut and its internal structure is almost the same but the outside shell is smooth. Cultivated varieties usually crack easily and in such a way that the kernel is released in halves. From all this, it is easy to see that the heartnut is not only a beautiful tree but is definitely useful.

In my own work with heartnuts I have found that, although they are to be classed only as semi-hardy, there are a few varieties which are hardy enough for northern temperatures. Only testing will determine which ones can endure severe climates. In the spring of 1921, I planted a Lancaster heartnut grafted on a black walnut, but the weather was cold that season and it was killed down to the graft joint, where it threw out a sprout. This was weak and succulent by fall and the graft was entirely killed back that winter. I bought twelve more Lancaster heartnuts a year later. They were interspersed in the orchard among some black walnuts. Although a few survived the first winter, none ever lived to come into bearing. From time to time, I also experimented with seedlings sent to me by Professor James A. Neilson of Vineland, Ontario, who was interested in having them tested in this latitude. These, too, were always unsuccessful.

I had my first success with several unnamed varieties of heartnuts I purchased in 1933 from J. U. Gellatly of British Columbia. These were grafted on black walnut stocks of considerable size. To insure their surviving the first winter, I built wooden shelters which completely enclosed them, filling these shelters with forest leaves and protecting them against mice with screen covers. No doubt this was a decided help; at least all of these heartnuts lived for many years until the invasion of the butternut curculio and the damage done by the yellow bellied sap sucker bird caused me the loss of all except one variety, the Gellatly. This variety I have perpetuated by re-grafting on other black walnut stocks and by spraying and covering the limbs with screen to prevent the sap sucker from working on it, still have it in the nursery and at my home in St. Paul where a young tree on the boulevard bears each year.

Page 48

I have found that heartnuts are difficult to propagate, the number of successful grafts I have made being far below that of black walnuts on black walnut stocks. The reason for this is not well understood any more than is the fact, in my experience, that the Stabler walnut will graft readily and the Ten Eyck persistently refuses to. A good feature that these grafted trees do have, however, is their early productiveness. I have seen them set nuts the second year after grafting and this has also occurred in trees I have sold to others.

When a nut of J. sieboldiana cordiformis is planted, it does not reliably reproduce itself in true type, sometimes reverting to that of the ordinary Japanese walnut, which looks more like a butternut and has a rather rough shell as distinguished from the smooth shell of the heartnut. In hulling my heartnut crop for 1940, I noticed many deformed nuts.

The season had been a prolific one for nut production of all kinds, and I knew there had been a mixture of pollen in the air at the time these nutlets were receptive (a mixture made up largely of pollen from black walnuts, butternuts, with some English walnuts). Since irregularities in size and shape indicate hybridity frequently and since heartnuts are easily hybridized I have assumed that these were pollinized by the mixture. I have planted these odd-shaped nuts and I expect them to result in many new crosses of J. sieboldiana cordiformis, some five to eight years from now.

[Illustration: *Beautiful tropical looking Japanese Walnut (Juglans sieboldiana cordiformis). Variety Gellatly, from Westbank, B. C., Canada. Photo by C. Weschcke.*]

To show how nature reacts to much interference I will follow through on these nearly 100 small trees that resulted from this pollination. They were transplanted into an orchard on a side hill and well taken care of for several years, but during that time one after another was killed, apparently by winter conditions or perhaps the site was too exposed or the soil may have been uncongenial. Today there remains but three trees, none of which have borne but all indicate that they are true heartnuts from the shape of the leaves and color of the bark and general formation. In order to hasten their bearing, scions have been taken from these small trees and will be grafted on large black walnut stocks to bring them into fruitfulness much earlier than if they were left to their own slow growth. This system of testing out seedlings long before they have reached a size sufficient to bear on their own roots is applicable to all of the species of nut trees and is one way that the plant breeder can hurry up his testing for varieties after making crosses and obtaining young plants.

[Illustration: *Natural size Heartnut. Photo 10/26/38 by C. Weschcke. Gellatly variety.*]

Beechnut

Page 49

The beechnut, Fagus ferruginea, belonging to the oak family, is one of the giants of the forest, growing to great size and age. Even very old beech trees have smooth bark and this, in earlier and more rustic days, was much used for the romantic carving of lovers' names, as scars still visible on such ancient trees testify. The wood itself is dense and hard, even more so than hard maple, and is considered good lumber. Beechnut is one of the few nut trees with a more shallow and ramified root system as contrasted with that of most, which, as in the oak, walnut and hickory, is a tap root system. This fact suggests that in those localities where beeches grow wild, grafts made on such trees, and transplanted, would survive and grow well.

Perhaps one of the reasons why very little propagation is done with beeches is that no outstanding variety has ever been discovered. Although the nut shell is thin and the meat sweet and oily, the kernel is so small that one must crack dozens of them to get a satisfying sample of their flavor. This, of course, prevents their having any commercial value as a nut. There is also the fact that the beechnut is the slowest growing of all the common nut trees, requiring from twenty to thirty years to come into bearing as a seedling. Of course this could be shortened, just as it is in propagating hickories and pecans, by making grafts on root systems which are ten or more years old, as explained in the chapter on heartnuts. However, I know of no nursery in which beechnuts are propagated in this way.

My attempts to grow beechnut trees in Wisconsin have met with little success. About the year 1922, I obtained 150 trees from the Sturgeon Bay Nurseries. I planted these on level ground which had clay near the surface with limestone about a foot under it. Although all of these trees seemed to start satisfactorily, some even growing about a foot, within two or three years they had all died. I decided they were not hardy but I now realize that the character of the soil was responsible for their gradual death; they should be planted in a limestone or calcareous soil, preferably of the fine sandy type, the main requisite being plenty of moisture because of their shallow root system. Since then, I have purchased beechnut seeds several times from various seedsmen, but none of these seeds has ever sprouted. I think this is because beechnuts, like chestnuts, must be handled with great care to retain their viability.

In 1938, I ordered 100 beechnut trees from the Hershey Nurseries of Downingtown, Pennsylvania. Although these trees were set in sandy soil, there are now only about five of them alive, and of these, only four are growing well enough to suggest that they will some day become big trees.

Beechnuts must be protected against mice and rabbits as these species of rodents are very fond of bark and young growth of these trees and I have every reason to believe that deer are in the same category.

Page 50

Oaks

Although the acorns produced by the red oak are very bitter and consistently wormy, those from the white oak are more edible. In my own exploring, I have found one tree, apparently a hybrid between the red and white oaks, which bears good acorns. The nuts, which are long and thin, are generally infested with weevils. If there were a demand for such a nut tree, I'm sure that it could easily be grafted on oak roots. During favorable seasons, when these edible nuts were of good size and free from worms, I have carried them in my pocket and enjoyed munching on them. I found that their flavor, like that of chestnuts, was improved by roasting.

Acorns are a balanced food and contain enough starch to make them readily assimilated, except for their bitterness. They are a good food for farm animals and chickens. I have kept a flock of goats in good condition by feeding them acorns during the winter. It isn't necessary to grind them for such use. I have read that Indians at one time prepared acorns for their own use by storing them in bags submerged in cold running water. This not only extracted the bitterness but also it probably discouraged the development of weevil eggs.

Oak trees are generally prolific and are regular bearers, but of course, what they are widely known and loved for is the beauty of their leaves in the autumn. No one doubts their esthetic value, which will keep them forever popular whether they come into demand as a grafted nut tree or not.

Chestnuts

Another of our ornamental nut trees is the chestnut, also of the oak family, classified under the genus Castanea, which grows into a large, beautiful tree with wide-spread branches. Chestnuts do not grow well on limestone soil and always fail in the heavy blue clay so common on farm lands in this part of the country. It is best for their growth that the soil be gravelly and slightly acid.

The chestnut has always been a good timber tree. Its wood, although not as hard as the red oak, resembles it in grain. The beams of many old pioneer homes are found to be chestnut. It is said that this is one of few woods to give a warning groan under too heavy a burden before it cracks or breaks. Chestnut wood is very durable in contact with the soil, outlasting all others except possibly black walnut and cedar. It contains so much siliceous matter in its pores that it quickly dulls chisels and saws used in working it.

The chestnut trees at my nursery were grown from mixed hybrid seeds which I obtained from Miss Amelia Riehl of Godfrey, Illinois. Almost all of the seeds she first sent me, in 1926, spoiled while they were stored during the winter. But Miss Riehl sent me more

the following spring, many of which proved hardy. In 1937, the oldest of these trees produced staminate bloom for the first time. I naturally

Page 51

expected a crop of nuts from it that year, but none developed. The same thing happened in 1938. I then wrote to Miss Riehl about it, also asking her where to look for the pistillate blossoms. Her reply was a very encouraging one in which she wrote that the pistillate blossoms appear at the base of the catkins or staminate blooms, but that it is quite a common thing for chestnut trees to carry the latter for several years before producing pistillate blossoms. She also explained that it was very unlikely that the tree would fertilize its own blooms, so that I should not expect one tree to bear until other nearby chestnuts were also shedding pollen. This occurred the next year and another chestnut close to the first one set a few nuts. It was not until 1940 that the tree which had blossomed first, actually bore nuts.

In 1940, I crossed the pistillate blossoms of this tree with pollen from a Chinese variety called Carr, resulting in half a dozen nuts which I planted.

Since the chestnuts in these parts do not bloom usually until early July we can expect chestnuts to be a more reliable crop than butternuts, for instance, which bloom very early in the spring about May 1 to 15th.

Having had this reward for my efforts I took much more interest in chestnut growing and ordered trees of the Chinese varieties, Castanea mollissma from J. Russell Smith, H. F. Stoke, and John Hershey. Some of these were seedlings and some were grafted trees, not over a dozen of them alive today and none have produced mature nuts. Seemingly they have not been hardy although they have grown large enough to produce both staminate and pistillate blooms; they have never winter killed back to the ground, however.

Also, I have been planting nuts from all sources from which I could obtain them, mostly of the Chinese chestnut type. Some of these nuts were results of crosses, and showed their hybridity in the young seedlings that resulted there from. Today I have perhaps 150 of such young seedlings which I am pampering with the hope of getting something worthwhile from them. One of the big thrills of chestnut growing was the result of a chestnut that I picked up from a plant that was no higher than 2 feet, growing at Beltsville, Maryland in the government testing ground there, in 1937. My records show that this plant began to bear nuts in 1943 and have subsequently borne several crops in between the times that it was frozen to the ground and grew up again, which happened at least three times. Like most chestnuts this one has to be pollinated by taking the staminate bloom from a dwarfed chestnut nearby whose bloom coincides with the blossoming of the female flowers of this Chinese hybrid. Chestnuts rarely set any nuts that produce mature seed from their own pollen but depend on cross-pollination. The nut from this hybrid is also the largest of any that I have grown and to my taste is a palatable one. It may not rank among the best ones of known varieties

Page 52

today, but for our climate I would consider it unusually large and good. Experimentally, I have been able to produce new plants from this tree by layering young shoots coming from the roots. This generally requires two years to make a well-rooted plant before they are cut off and transplanted. This alternative of propagating by grafting or budding is considered a better method if it can be practiced, as it gives a plant on its own roots instead of the roots of some unknown seedling stock.

[Illustration: *Hybrid Chestnut; natural size, one of the two survivors of several dozen trees sent by the U. S. Dept. of Agriculture for testing this far north. Fair size nut and it resembles the American Sweet Chestnut. Photo by C. Weschcke.*]

Another tree that surprised me when it came into bearing proved to bear one nut in a burr which led me to believe that it was a chinquapin hybrid. Later on, the habit of this tree changed somewhat and some of the burrs had more than one nut. I have found this to be the experience of others who have observed so-called chinquapin trees of a hybrid nature. It is my belief that the kind of pollen with which these blossoms are fertilized directly influences the number of nuts in a burr and sometimes the size of the nuts, again showing the importance of the cross-pollinating varieties when setting out an orchard of trees. This particular chinquapin type chestnut has upright growing habits different from a tree bearing similar nuts but having a very dwarfed habit. All of the nuts of the latter after six years of bearing can be picked off this tree by standing on the ground. There are several other trees bearing chestnuts, some large and some small nuts, all of which are interesting to me and may be important in the future of the chestnuts this far north since they indicate without doubt that the chestnut can accommodate itself to our climate, providing it has the right type of soil to grow in. In 1952 I acquired a 20-acre adjoining piece of land which has a much better chestnut growing site, being deep sandy soil, well drained, and yet not ever being dry. New varieties will be tested on this piece and should give much better results than the old trees which already were good enough to indicate success in chestnuts.

[Illustration: *A hybrid chestnut presumed to be a cross between European Chestnut (Castanea Sativa) and its American cousin (Castanea Americana). Actual size. Photo by C. Weschcke.*]

[Illustration: *Chinquapin hybrids from a tall growing tree. Nuts grow in racemes of burrs with as many as 10 burrs on one stem. Photo by C. Weschcke.*]

Apricot

If it were not that an apricot is a nut as well as a fruit, I should hesitate to include a description of my work with it. But the apricot seed has a rich kernel which, in many

countries, for example, China, is used as a substitute for the almond to which it is closely related.

Page 53

It was in 1933 that my aunt, Margaret Weschcke, told me of an apricot tree growing in a yard on the Mississippi River bluff in St. Paul and said to be bearing fruit. I was quite skeptical until I saw the tree and also saw fruit from it which had been preserved by the woman who owned it. Convinced of the hardiness of the tree, I was anxious to obtain scionwood but it was not until late that winter that I received permission to do so. It happened that a truck had broken off a large branch from the tree while delivering coal, and the owner very reasonably decided that taking a few twigs from it would not hurt it any more. I not only took the small branches that she was willing to sacrifice from her tree but also as many as possible from the branch which had been torn off, as its terminals were still in a fresh condition.

I grafted these scions on hybrid plum trees where they took hold readily, and in 1938, they began to bear prolifically. The apricots, which I have named Harriet, in honor of my mother, are a fine-flavored fruit, medium in size. Their cheeks are a mottled red with raised surfaces. Their pits are well-formed and fairly edible. Although the parent tree died the winter I took scions from it, my grafts have proved quite hardy, having received no injury when temperatures as low as 47 deg. below zero have occurred. Since the parent tree died because its roots were severely frozen, it would seem that the top of the tree, in this case, was more hardy than the root system. This does occur sometimes, although it is unusual.

In developing the factor of hardiness further in this apricot variety, I have taken advantage of something I had observed about other fruit trees. When one combines parts of two trees by grafting, it is a simple thing to select a hardy root stock from the available plants, just as I selected hardy plum stock on which to graft my apricot scions. This is not always possible in choosing scionwood, however, since scionwood is usually selected for such reasons as the quality of its fruit. It may happen that the top part of a tree is limited in its climatic scope because of its inability to withstand precipitate or otherwise unfavorable temperatures. Having observed that certain grafted varieties of fruit trees, such as the Wealthy apple, for instance, have gradually come to be planted much farther north than they originally were, I reasoned that this was because only the hardiest of them survived and these hardy ones therefore became the mother blocks for future grafting. This was an inescapable procedure which acted as a method of bud selection. I therefore assumed that by a careful choice of the hardiest among surviving twigs of the most recent graft of the Harriet apricot, when particularly severe winter weather had caused some injury, I could induce extra-hardiness in future grafts.

Page 54

I also believe that I have added to the hardiness factor of the apricot by making frequent grafts. It is my theory that the root stock is able to exert some influence over the top other than mere maintenance of life. By frequently uniting a hardy stock with a less hardy top, I think that the individuality of the top part may be somewhat broken down and the extra characteristic of hardiness added to it. After the fifth re-graft of this apricot made in eight years, I am convinced by its appearance and behavior that it is capable of becoming a reliable apricot for the region around St. Paul. Today the apricot still exists grafted on plum at my nursery at River Falls, Wisconsin, and the weakness of the tree seems to be in the union between the top and the plum stock. If this union were not so corky and large and succulent it might be less injured by our winters; therefore it is quite apparent that the plum is not a congenial stock for an apricot, at least it does not produce a satisfactory union. I am now making tests with this same variety by grafting it on more hardy apricot seedling stock such as the Prof. N. E. Hansen of Brookings, South Dakota, introduces.

Chapter 11

PESTS AND PETS

The pocket gopher is an herbivorous animal which attains approximately the size of a gray squirrel. It has a sleek, grey-brown coat of fur which is almost as fine as that of the mole and would, I think, make a good quality fur except that the skin is too tender to stand either sewing or the wear that fur coats have to undergo. I learned this by trapping them and having a furrier try them out, as I knew that the quickest way to get rid of a pest is to eat it or use its hide. Since I found its hide to be of no practical value, I enjoined my troop of Boy Scouts, a willing group of boys, to carry out my suggestions that they skin and prepare one of these animals in a stew. Gophers are purely herbivorous and I thought they should be quite edible, but as I am a strict vegetarian myself, I had to depend on them to make this experiment. The boys followed instructions up to the point of cooking, but by that time the appearance of the animal had so deprived them of their enthusiasm and appetites that I had no heart to urge them to continue. I am still of the opinion, however, that to meat-eating people, the pocket gopher would taste as good as squirrel or pigeon.

The first introduction I had to the devastating work that these animals can do in an orchard was when I was working among my young apple and plum trees one spring. I noticed that the foliage was turning yellow on many of them and upon investigation I found that the trees were very loose in the ground. At first I thought that planting operations and heaving of the ground by frost in the spring might be the cause, but in testing the looseness of one of these trees, I found that I could pull it out of the ground easily.

Page 55

There I saw what appeared to be the marks of an axe. I was completely convinced that I had personal enemies who went around nights chopping off the roots of my trees, for I knew that most of my neighbors were completely out of sympathy with my tree cultivation. In fact, farmers living in that section of the country were always poking fun at my nut tree plantings and orchard work, for their idea of what was proper on a farm was a treeless field of plowed ground. As I thought of all these things, I pulled up many other trees; in fact, there were dozens that were chopped off so that they could be completely pulled out. Others still had one or two roots clinging to the main trunk and these I carefully replanted so that they would continue to live and grow.

Not long after the tragic day on which I found all these ravaged trees, I noticed, winding in and out close to the young orchard trees, the mounds which pocket gophers make when they tunnel under the ground. I followed some of these by digging into them with a shovel, and discovered that they led to the roots of trees, the very trees that had been chopped off and killed. My enemies were not human after all.

Sending for a pamphlet from the U. S. Department of Agriculture, I studied the material given about pocket gophers and their habits. I then began their systematic eradication, using about twelve steel muskrat traps. I succeeded in trapping, in one season, over thirty of them, at a time when they were so prolific and their holes so numerous that I could not drive a horse through the orchard without danger of breaking one of its legs. I also used poisoned grains and gases but I do not recommend them. Trapping is the only method in which one obtains actual evidence of elimination. It took me many years to force the gophers out of my orchards and I still must set traps every fall, during September and October when they are most active. Their habits are such that they do most of their tunnelling in the early fall months, before frost, during which time they expose and isolate the roots on which they intend to feed during the winter months when the ground is so hard that they cannot burrow further. This period is when they are most easily trapped.

It was with the idea of establishing a balance of nature against these animals that I conceived the idea of importing bull snakes. Almost everyone has heard of the bull snake, but its name is a poor one, for it has the wrong connotation. These snakes are actually a fine friend to the farmer since each snake accounts for the death of many rodents each year. Their presence certainly was of definite value in decreasing the number at my farm. Bull snakes have the long body typical of constrictors, sometimes reaching a length of nearly six feet at maturity, and being at the most an inch and one-half in diameter. This country had a natural abundance of such snakes at one time but ignorance and superstition have lessened their number so that it is now a rare

Page 56

thing to find one. During the early days of automobiles, these huge bull snakes, or gopher snakes, as I prefer to call them, would lie across the sunny, dusty roads, and drivers of cars delighted in running them down. Since they are very docile, they are the least afraid of man of any members of the local snake family. They are slow in movement until they sense the immediate presence of their natural food, which is live mice, rats, gophers, squirrels, young rabbits, and sometimes, though rarely, birds. Then it is they become alert, and the horny appendage on their tails vibrates with a high-pitched, buzzing sound, simulating, although not similar to, the sound of a poisonous rattlesnake.

When I first brought some of these snakes to my farm, I loosed them and they wandered off to a neighbor's premises where they were promptly found and killed. Later importations I confined to my basement, where I built an artificial pool with frogs and fish in it. However, I could never induce the bull snakes to eat any of these batrachians. They would, almost playfully, stalk the frogs, but at the moment when one was within reach, the snake would glide away. Neither would the snakes, unless force-fed, eat anything they had not caught themselves.

My children were delighted to have the snakes there and made pets of them. Only once was one of the girls bitten when she attempted force-feeding. The bite was a mere scratch but we feared that it might be slightly poisonous. However, it healed so promptly that it was quite apparent that the bull snake's bite is not toxic. I, too, have had my skin slightly punctured by their teeth, but always the wound healed with no more pain or trouble than a pin prick. Such is not at all the case when a person is nipped by a squirrel or gopher. I have purposely allowed a pocket gopher to bite me, to determine what the effects are. The pain was severe and healing was slow. Once, bitten by a gray squirrel when I reached into a hollow tree to get it, I received such a wound that fever started in my whole hand. Its teeth punctured a finger-nail and were stopped only by meeting the bone. Such bites I consider rather poisonous.

Rabbits also committed much damage at my nursery by gnawing the bark of my trees, especially during times of deep snow. They did not bother the walnuts particularly, but were very fond of hickories and pecan trees. On the smallest ones, they cut branches off and carried them away to their nests. On larger trees, they gnawed the bark off of most of the lower branches. This was dangerous but seldom fatal, whereas the gnawing of mice, near the base of the trunks, was such that in some cases when complete girdling occurred, it was necessary to use bridge-grafting to save the trees. This consists of connecting the bark immediately above the roots with the bark above the girdled portion, so that the tree can receive and send the food substances it elaborates to its upper and lower parts.

Page 57

Rabbits and mice, therefore, had to be dealt with. Of course, one could go hunting for rabbits and later eat them. This was one task I had my employees do. I, myself, was unwilling to take an active part in it, although still intent on saving my trees in spite of my pity for the little animals. Placing hundreds of cans in the orchard, with a pinch of poisoned wheat and oat mixture in each, helped to eradicate the mice. The bait was placed inside the cans to prevent birds from being poisoned, and the cans were tipped at an angle so that water would not enter them.

To be absolutely sure of preventing mice damage, one should provide each tree with a screen guard. I have made about 10,000 screen protectors for my trees for this purpose. I have also trapped rabbits which we were not able to shoot and I conceived the idea of painting the traps with white enamel. When these were set on the snow around those trees which the rabbits attacked, they worked very successfully. The traps were a size larger than the common gopher trap, but were not expensive. There are other ways of catching rabbits or curtailing their activities, but on my list, shooting comes first, with trapping as a second effective measure.

Squirrels, although they do no damage to the trees themselves, except on rare occasions, are a definite nuisance when they come in large numbers and cut down nuts before they are ripe. They do this to hickory nuts, and apparently are very fond of the half-ripened nuts. I have seen squirrels chew hickory buds and young sprouts of hickory grafts and I had to trap several before I stopped them from doing this to certain ornamental trees in our garden. In fact, when one has a large nut orchard, squirrels will be attracted in number that preclude the possibility of harvesting a crop unless measures are taken to banish them. They are very active early in the morning and my experiences indicate that two or three people should hunt them together, as they are very clever at dodging a single hunter. I also have built galvanized metal guards around isolated trees which prevent squirrels from climbing them.

In speaking of mice, we have two important species commonly known as the meadow mouse and the other species known as the white-footed mouse. The meadow mouse is the one that does so much damage to the orchard trees and young nursery stock if unprotected, and the white-footed mouse may be responsible for some of this when present in great numbers, but of the white-footed mouse this much good can be said:

[Illustration: Drwg. by Wm. Kuehn. *Squirrel guards.*]

Page 58

Much of its diet, especially of the mother mouse during the time that she is nursing her young ones, is made up of insects. A personal experience accentuates this. Since these are such pretty little creatures, having such cunning ways, it was my ambition to catch a complete family of mother and young ones which sometimes numbered as high as ten. My ambition was finally gratified and I was able to get a mother of eight and her tiny mouslings, which have a habit of fastening themselves securely to her breasts while she runs about, and drags them all along in a most ludicrous fashion. At times, under these circumstances, the combined weight of the brood exceeds that of the mother mouse but they are exceptionally strong creatures for their size, a mature mouse being able to jump out of a 3-foot barrel with one leap. In observing this brood of mice, I was particularly anxious to see what kind of a diet they throve on and tried the mother's appetite with tidbits from the table. While she ate most everything, it soon became apparent that something was wrong because the young ones became weaker, finally to the extent that they were unable to nurse, and one morning I found several on their backs with their feet feebly waving in the air indicating that they were dying of starvation. At about that time I was drying some hazelnuts on a flat back porch floor and in sweeping them up found a lot of alive and dried up larvae which had escaped from the shells. Just for fun, I swept this material up and threw it into the mouse cage. The reaction of this treatment was gratifying, for the mother mouse pounced upon this insect life greedily devouring everything. Within three days, the young mice were all in good health and running around showing that the milk produced from the diet that I had been giving the mother was inadequate for the baby mice. It is therefore to their credit to state that these mice and probably at times the meadow mice do consume large quantities of larvae and grubs in the surface soil, as well as mature active insects, such as crickets and grasshoppers.

HOW TO PREPARE RODENT PROTECTORS FOR TREES

1. Cut 6" strips from 24" wide roll of galvanized screen with a 12 x 12 mesh.

2. Cut strips in half to make two protectors from each strip.

3. Make bundles of 25 each by running wire through protectors.

4. Dip these bundles in a solution containing 5 pounds of red lead per gallon of linseed oil. Use from 3 to 5 gallons of this solution.

5. Remove bundles and hang them on a pole with a drip pan beneath to catch the solution, which can be used again. Allow bundles to drip for 8 hours, then separate each protector and place on grass for a few days to dry.

6. Roll each protector around a 3/4" pipe or broomstick and it is ready for the tree.

[Illustration: Drwg. by Wm. Kuehn. *Preparation of screen guards.*]

Page 59

In dealing with wild creatures, one must forebear condemning a whole species of animals merely because at times they become troublesome, for the main purpose of their existence, like owls, hawks and crows, they may be more beneficial than otherwise.

A good word should be said here for skunks and moles. A great deal of the skunk diet is insect life. The same is true of the mole whose diet probably consists of 75% insects, mostly in their larval state. This is an important feature of mole and skunk as they dig these insects out before they mature into winged female adults which may lay hundreds of eggs. If these larvae should be allowed to develop into a mature winged insect that would lay eggs, this particular insect would multiply itself hundreds of times over and it would take many more birds than at present exist to take over the big job of keeping the balance between necessary insect life and a surplus which would be destructive to all plant life. We can never hope to eradicate all insect life which we deplore as being deleterious to the interests of mankind, and it is mighty well that we cannot do this for the insects are as important to us as all other life, for without them we would be unable to produce the vast quantities of foods that are now dependent upon such insect life. It is true that they take their toll of the food that they are instrumental in sometimes producing but when one attempts to unravel the mystery of balance of nature one is confronted by the big question of how far to go in the eradication of both animals and insect pests. Before man's interference the wild crops were plentiful and balances were kept in harmony by vast multitudes of frogs and toads, birds and rodents, all of which have been slaughtered and reduced by such amounts as to endanger man's food supply, forcing him to resort to poison sprays and other measures in order to hold destruction in check. All of this expense and trouble he could have avoided if he had been sensible enough to observe the natural checks and foster the natural procedure of which nature is the best guide.

Chapter 12

STORING AND PLANTING SEEDS

Most nut tree seed requires ideal storage conditions to preserve its germinating power or viability. Under natural circumstances, such nuts as black walnuts, English walnuts, butternuts, hickory nuts, pecans, hazelnuts, filberts and almost all other nuts, will be planted by squirrels, mice and other rodents. Although most of these will be eaten by the animals who buried them, a large percentage of the ones which are not eaten will sprout. The sprouts which achieve maturity and bearing age, however, will be only a very small percentage—some say only a fraction of 1%—of the number that sprouted. This is an expensive and wasteful method, horticulturally speaking, but it does indicate that it is best to plant nuts as soon as possible after they have properly ripened and been dried.

Page 60

After walnuts, hickory nuts, butternuts and hazels have been gathered, they should be dried until the hulls have lost most of their moisture. The husks should be removed from filberts before they are dried. While this preparation is not essential, nuts are less likely to mold if they are dried somewhat before they are planted. However, I have planted freshly-gathered black walnuts and butternuts and most of them sprouted. If nuts are to be stored in large quantities, the drying-out process is absolutely essential and should be carried to the point of completely drying the hulls. The system I followed in doing this is to gather the nuts after they have fallen and spread them out in the sunlight on roofs or floors where air can circulate around them. After the hulls are dry, such nuts as black walnuts, English walnuts and butternuts may be put in barrels or burlap bags and stored in an unheated basement without seriously deteriorating. English walnuts are most safely stored when they are hulled before being packed in burlap bags. These bags should be suspended above the floor of the cellar by a rope or wire. These are additional precautions which allow better circulation of air, further prevention of mold, and safety from mice and squirrels.

Chestnuts, beechnuts and acorns require more care when they are to be stored, for their viability is very sensitive to dryness. I have found that these soft-shelled species of nuts should be treated in a different manner than the walnut and hickory types of seeds if we are to get the most out of their germination. Since chestnuts are very prone to molding or rotting, the best way to maintain their viability and freshness over winter is to stratify them in a can or box between layers of a peat moss. This peat moss must be decidedly on the acid side and must be dampened, but must not be so wet that you can wring any water out of it. The best way to prepare this dry peat moss is to soak it in water and wring as much water out of it as possible by squeezing with your hands. Then mix it with half as much of the undampened peat. This will give you approximately the right moisture coefficient. If stored in cans, the bottom of the can must be punctured with a few holes about 1/4 of an inch in diameter, well distributed on the bottom to act as a drain and to admit some slight circulation of air. The same thing should be done with the cover.

First, put down an even layer about 1-1/2 inches of this dampened moss, then put in a layer of chestnuts or other nuts to be stratified, placed evenly or well distributed but not touching each other. After the first layer, carefully sift in more dampened moss about 1 inch thick and repeat the process until either the can is full or all the seeds have been stored. The last layer should be a 2-inch layer of peat moss before the cover is placed on. Now the important thing about all this is to place this can in a storage room of low temperature and yet it should not freeze solid. But in a temperature of from 32 to 40 degrees is ideal and preferably it should be on the ground floor so as to maintain the moisture that is already stored in the seed and the moss. A mechanical refrigerator which would constantly dehydrate might eventually dry them out too much for good germination; otherwise such a refrigerator would be ideal for the storage of small amount of seeds of this kind.

Page 61

It would be well from time to time to inspect these seeds to see whether they were in good condition and check the temperatures as well. If they start to sprout all the better; they can then be planted with the sprout downward and the nut barely covered with earth. Some years I have had sprouts nearly six inches long on my chestnuts which had been so stored and care will have to be taken not to break the sprout when transplanting the nuts.

In planting nuts, great care must be taken not to plant them too deeply. Large nuts, such as black walnuts, butternuts and English walnuts, are often planted with a small part of the nut still exposed. Certainly, the depth of the soil over a nut should never exceed the thickness of the nut. Most seeds develop best when they are planted just under the surface of the soil. The earth should be lightly tamped around the planted seeds to eliminate air-pockets. A thin coating of manure, not more than three inches deep, is valuable if large seeds are planted but it is detrimental to the development of small seeds and manure should never be used for evergreens. Seeds of the nut pines, usually purchased from seedsmen and received in a dry state, should be planted no deeper than their own diameter in a light, sandy loam. A seed bed, incidentally, is a very necessary protection against rodents in the case of nut pine seed. I have used a mixture of bone meal on such seeds with good results. Four quarts of bone meal carefully worked into the first two or three inches of the surface soil of a 4 x 12 seed bed greatly increases its fertility. Sifted hardwood ashes scattered over the bed after the seed is in, will discourage cutworms and increase the potash content of the soil.

Proper drying and storage are of no use if nuts are not planted where they will have protection against rodents, improper drainage, and other hazards. To keep them from being eaten by rodents, nut seeds should be planted under wire screens inside a deep frame. The seed beds I have made for use in my nursery are four feet wide and twelve feet long. By using heavy galvanized hardware cloth 2 x 2 mesh, which means that it has 1/2-inch square holes, is ideal for the top and sides of this frame. By using this wire cloth 2 feet wide, 18 inches is sunk under the ground surface, and only 6 inches protrudes above. This is to prevent burrowing rodents from going underneath and extracting the seeds which you will find they will do unless the screen protection goes down deep enough into the ground to discourage them. A stout frame of rot-resisting wood, such as cedar or fir should be placed on the inside of this countersunk screen. This should also be 4 feet wide, 12 feet long so that a similar frame, which is removable, can be placed over this. The edges of the frame should match perfectly so that no rodents can reach the interior of the seed bed without going down 1-1/2 feet under ground to burrow under the countersunk screen. Several thousand evergreens or several hundred walnut trees can be raised in a seed bed this size.

Page 62

The soil is now removed from the inside of this enclosure or stationary part of the bed to the depth of 6 inches so that the plants will have head room to develop leaves and stems and still be protected under the top or removable frame part. The top frame made of the same material and covered also by the 2 x 2 hardware cloth should be about 6 inches in height so that there will actually be 18 inches of head room for the plants to grow in before touching the screen.

[Illustration: *This 60 x 30 foot corrugated galvanized iron fence 3-1/2 feet tall and sunk 6 inches into ground protects valuable hybrids against invasion by rodents. Photo by C. Weschcke.*]

There are several important points to remember in starting a seed bed. It must be in a well-drained site, so that the seeds will not be under water or water-logged for any length of time. It should be in an open place where sunlight is plentiful, unless evergreens are being grown. Evergreens must be in half-shade the first season to avoid a condition known as “damping off.” The top six inches of soil in the bed should be the best garden soil obtainable, the growth resulting from using good, clean soil, free from weed seeds, being worth the trouble of preparing it. By having the bed in two parts, with a cover that may be taken off, proper weeding can be done when necessary. The cover should always be replaced afterward, though, as rodents will sometimes attack the young shoots and the remainder of the seed kernel.

In the spring of the second season of growth, the young plants may be dug up and lined out in nursery rows. After two or three years more, they may be planted in permanent locations.

Chapter 13

TREE PLANTING METHODS

Since nut trees usually have deep, well-developed root systems of the taproot type, they are more difficult to transplant than such trees as plum, apple, elm or maple which have many small fibrous roots. Taproots have a long, main trunk like a parsnip, from which lateral roots branch. These roots are heavy and may extend deep into the ground even in trees only two or three years old. In moving such a tree, the lower part of the central taproot must, of course, be cut off, but as many of the side roots as possible are retained. Because such roots have no fibrous or hair-root system, their handling during transplantation necessarily differs from that of the ordinary shade or fruit tree.

If trees having a taproot system, such as the English walnut, black walnut, butternut, hickory or pecan, are received with bare roots, they should be treated in the following way: Immediately after the trees have been unpacked, their roots should be submerged in a barrel of water for several hours. After their thirst has been quenched, the roots

should be dipped into a mixture of clay and water made to the consistency of thick paint. With a heavy coating of wet clay around them, the roots may then be wrapped in wet burlap sacks. They are now ready to be transported to their planting site.

Page 63

Selecting a favorable location for nut trees is very important. They should never be planted at the bottom of a gulch or valley because, in such places, frost pockets may occur which will interfere with both blossoming in the spring and ripening of nuts in the fall. Nut trees grow best near the summit of a hill. Although such soils are difficult to plant in, stony soil or soil overlaid with limestone results in good growth. Shallow surface soil, underlaid with heavy clay, will usually slow down the growth of a young tree so that it remains dwarfed for many years. It is more satisfactory to have at least three feet of soil before clay is reached. If the soil is light and sandy, it will be improved by adding black dirt immediately around the roots of each tree.

As most nut trees ultimately grow to be very large, they should be planted at least forty feet apart. The hole dug to receive each tree should be wide and deep enough to accommodate the roots without bending or twisting them. If the excavated soil is of poor quality, it should be discarded, and good, rich soil brought in for setting the tree. Trees should not be planted too deeply. The collar of a tree, which is a discoloration of its trunk resulting from contact with the ground, indicates how much of the tree was previously underground. Although it is a good idea to plant so that this collar is a little lower than the surface to allow access to extra moisture, the actual planting depth should be about as it was previously in the nursery. All broken or damaged parts on the roots should be trimmed smoothly with pruning shears. Such clean cuts will send out new rootlets to replace the lost ones. After a tree has been set into the hole made for it, the soil, which should be thoroughly mixed with a quart of bone meal to increase its fertility, is replaced a little at a time. It must be packed very solidly about the roots with a rounded tamping stick to avoid leaving air pockets. I find it advisable to retamp the earth about each tree two or three times during the first year’s growing season, to insure intimate contact between soil and roots.

Planting should be delayed if the soil is very wet. Trees will stay in good condition for several days, if the burlap sacks are kept moistened. Wet, soggy soil is certain to shrink away from the roots and leave air pockets which will, in time, kill the trees. If trees are transplanted during a very dry season, they should be thoroughly watered. To do this, remove several shovelfuls of dirt from the ground about a foot from the tree, being careful not to cut any roots. Fill this hole with water and after the water has seeped away, fill it two more times. The tree should receive about five gallons of water. Sprinkling with a hose does not suffice. If dry weather continues, each tree should be watered in this way every week.

Page 64

Nurserymen in the future will have to deal with this transplanting problem in a different way than the old time nurserymen who handles fruit trees. A suggested way to improve the root system and at the same time make it easy to lift the tree with a ball of dirt, similar to the way an evergreen is transplanted, is to prepare a pocket of special transplanting soil previous to the lining out (which is the term used by nurserymen in setting out seedlings preparatory to grafting them in nursery rows). A suggested balanced soil for making the method practical is to use 1/2 by volume of peat moss; the other half should be rich, black sandy loam with very little clay mixture in it. In other words, each nut tree should be allowed about a bushel of soil for its development, 1/2 bushel to be peat moss, the other half bushel to be represented by rich black loam. This mixture will encourage many fibrous roots to develop and when the tree is dug, approximately all of this bushel of soil will be retained around the roots. Having such a high proportion of peat moss makes it lighter than ordinary ground; such a ball and the tree will weigh approximately from 100 to 125 pounds which can be shipped by freight at a low rate and is well worth the extra price that nurserymen must ask for a specimen of this kind. Such trees have really never been unplanted and for this reason do not suffer the shock which is inevitable in the usual transplanting process. Although pre-planted trees are more expensive to buy and to transport, their improved chances of living make them worth the price. The above recommendation is especially applicable to young grafted hickory trees since they are among the most difficult trees to transplant satisfactorily. The English walnut (Persian), black walnut, butternut and especially the hickory are improved by the use of a handful of ground lime mixed with the soil in preparing these pockets which will later constitute the ball surrounding the roots of the tree to be transplanted.

There is a tendency in grafted trees to produce sprouts below the graft. Unless these are rubbed off, the grafted portion will become discouraged and the tree will revert to a seedling variety. Filberts should never be allowed more than two or three stems, or trunks, while one is more preferable. If they are allowed to have more, they will produce a rank growth of wood but only a few, if any, nuts. I stress, by repeating, that trees should not be planted too deeply and that great care must be taken to eliminate air pockets. Extra effort and nursing of transplanted trees during the first season will be repaid by their successful development and growth.

It is a wise precaution to place a protective screen around the trunk of each tree to prevent rodents from attacking it. Mice gnaw off the bark near the ground, sometimes girdling a tree and so killing it. Rabbits chew off branches and they, too, may girdle the upper part of a tree. Rabbits are very fond of pecan and hickory bark. In some places, it may be necessary to encircle each pecan and hickory tree with a three or four-foot rabbit fence until the tree is large enough to lose its appeal to these nuisances.

Page 65

Compared with the number of insects which infest fruit trees, very few attack nut trees. One of those which does is the walnut-leaf caterpillar. These appear as a closely congregated group of small worms which feed on the leaves of black walnut and hickory trees during the latter half of the summer season. Very often they are all to be found on a single leaf, which should be picked from the tree and crushed underfoot. A simple spray of lead arsenate of the strength recommended by companies selling spray material, will effectively rid trees of these pests. Another insect often found in a nut orchard is the oak tree girdler, which also is active in the latter part of the summer. It often causes limbs as large as an inch in diameter to be cut through and to fall to the ground. By removing such freshly girdled branches and cutting into the hollow made by the larva, it is possible to find the live worm and destroy it. A good way to combat this pest is to keep each tree pruned of all dead branches and to burn all broken and dead wood each fall. While some nut trees are subject to other insects, the two described here are the most frequently found. Fortunately, they are easily controlled if a watch is kept for them.

Chapter 14

WINTER PROTECTION OF GRAFTS AND SEEDLINGS

It is not enough to make a successful graft and to watch it carefully during the growing season, picking all sprouts off the stock, spraying it so that insects will not chew the tender leaves and bark, bracing it against windstorms and perching birds. Each graft must also be protected from winter injury. For many years I have studied and experimented to find a successful way of achieving such protection. To enumerate my many experiments, from simple to far-fetched, would be to write another book quite as long as this one. My conclusion, now, is that there is little one can do to assist nature in the process of acclimatizing grafted plants and seedlings.

I have repeatedly noticed that the place where most damage is done by the cold is at the union between stock and graft. For example, I observed this on the European walnuts, imported from Poland, grafted to Minnesota black walnut stocks. Although both the buds and the wood of the top remained fresh and green, the unions suffered severe, and sometimes total winter injury. In grafts where the latter occurred, the dead cells soon caused the wood to ferment and sour. Occasionally, a small group of healthy cells succeeded in re-establishing circulation with the unharmed, grafted top and the graft, continuing its growth, would eventually overcome the injury it had suffered. I have seen this occur with grafts of English walnut, apricot and pecan.

Page 66

A blackbird's nest in the crotch of a small tree suggested to me the most satisfactory guard I have yet found against this greatest of dangers to all exotic, grafted varieties of nut trees. The nest, which enclosed over half of the graft union, was partly composed of woolen fibers which its builder had gathered from barbed-wire fences that sheep had brushed against. On the exposed portion of the graft union, discoloration indicated injury and dead cells, but on that part covered by the nest, all the cells were alive and green. I have improved on the bird's nest by wrapping a large wad of wool loosely around each graft union. The value of wool is that it will not collect moisture and so start fermentation. It allows the cells to breathe, yet protects the union from the shock of temperature extremes. Birds will inevitably steal some of the strands of wool but this activity in and about the trees means a decrease in injuries from insects—a worthwhile exchange.

When an unusually large swelling at the graft union appears, it is certain that the plant needs protection such as I have described. Such swellings result from a too-rapid multiplication of cells, a condition which leaves the union weak and susceptible to injury. Although a union is never entirely safe, even after many seasons of growth, each year adds to the safety factor by the development of rough, cork-like bark. I suggest the use of a woolen guard for several winters, by which time this outer bark should be able to do its protective work alone.

A successful but rather expensive method of winter protection, both to the graft itself and its union with its host, is to enclose the entire tree with a box-like structure consisting of four corrugated aluminum roofing sheets set up on their ends and countersunk into the ground about six inches. The purpose of countersinking these below the ground surface is two-fold: it stiffens and braces the structure and prevents the intrusion of mice and other rodents, which may also appreciate both the shelter and possible food supply contained therein. By fastening these sheets together with a stout wire you can depend on the structure to stand up against wind and snow pressures. Fill the entire inside with forest leaves, oak leaves preferred, as their insulating quality is the best and they are slow to rot and ferment.

When working with semi-hardy plants in a cold climate, avoid fertilizing and cultivating the ground after the first of August. Doing so stimulates late growth and such growth is very likely to be badly injured during the winter months. If fertilizer is used, it should be early in the spring, as soon as the ground is free from frost. Trees which persist in growing late into the fall are more subject to winter injury. Protective measures to avoid their doing so by inducing an earlier dormancy, include keeping the soil around them dry and exposing, somewhat, the roots near the trunk of each tree.

Page 67

My last word of advice in raising what might be termed semi-hardy trees, is to grow them in sod, the ordinary quack grass, June grass, bluegrass or other natural grass sods which can be found on your planting site. Although this will probably hold back your tree development for a few years, until the roots are thoroughly established in the deeper soil beneath the sod roots, it is surprising how many species of trees will thrive in sod and perish on open cultivated ground. I can give no better example of this than relating a circumstance which bears this out in a most convincing way. In 1941 I purchased about 250 filbert seedlings from Samuel Graham of Ithaca, New York. These were planted out on a field site and practically all of the plants made good growth the first year. They were thoroughly cultivated. The next year a second batch of plants of a like amount were purchased from the same man and of the same kind of seedlings. Mr. Graham told me that these were seedling trees from Jones hybrid seeds which he had growing in his orchard. These plants were put on heavy sod ground; all plants were protected by screens, but the plants on the sod ground were subject to a very wet season and it was necessary to build up the soil around some of the plants in order to save them from being drowned out. Today about 45 plants are living on the sod culture and two or three barely alive exist in the open field culture. Although the plants remaining alive on the sod culture plot are almost pure filbert strain they are therefore very subject to the common hazel blight. Some have grown into bushes 10 feet high which later were hit by blight and have been reduced to small bushes. Others are producing good filbert-type nuts and are somewhat blight resistant, but the main fact to remember is that about 1/4 of the plants on sod culture lived, whereas not over 2% are alive of the open field culture plants. The distance between these plantings is approximately 1/8 of a mile. In addition to being placed in sod these filberts which have survived are sheltered by rows of evergreen trees both on the south and on the north side which may be construed as of some assistance but is not altogether the reason for the tremendous difference between the winter protection value of sod and open field culture. This is not the only example that I could cite but is one of the most outstanding ones which has come to my attention. Sod culture is now being recommended to fruit orchardists in this part of the country and in my own experience, I can highly recommend it for apples, plums, pears, mulberries and nut trees.

Chapter 15

TREE STORAGE

If it is necessary to store trees through the winter months, one of several procedures may be followed. If the trees are quite small, their tops may be dipped in melted paraffin or beeswax, not hot enough to injure the buds. If the trees are too large for this to be practical, wax may be painted on with a brush. Roots should be protected by heeling them in dirt.

Page 68

An unheated cellar with a dirt floor is a very satisfactory place for storing trees. Select a corner of the cellar far from any source of heat or temperature change. Place the trees so that the roots are pointing toward the basement wall. Cover the roots to a depth of six inches with either sand or sandy loam, packing the soil firmly to eliminate air pockets. Lastly, cover the trees completely with burlap sacks. Once every two weeks, the earth around the roots should be watered. Trees maintained in this way are conveniently ready to plant when the ground thaws out in the spring.

Another and better method of storing trees is to plant them outside in a trench, preferably on the north side of a building, having first waxed them as described above. One side of the trench should slope so that the trees will lie in an oblique position with their branches touching the ground. The roots of these trees should be covered with dirt, then more trees set alongside them, until all have been planted and the earth made firm about their roots. Trees will usually suffer no damage during such winter storage if their roots have been properly packed in sand or sandy loam. Six or more cans, each containing a little poisoned grain, should be set among the branches. If these cans are laid on their sides, rodents will have easier access to the poison. The branches of the trees should then be well covered with straw or hay, with heavy boards laid on top to keep it from blowing away. If trees are received for planting after the ground has frozen, all that is necessary is to build a log fire on the side where they are to be heeled in. This will thaw out the soil enough so that a trench can be made to accommodate them.

Chapter 16

SUGGESTIONS ON GRAFTING METHODS

Grafting, including budding, may be defined as inserting a piece of wood which carries buds of a desired variety, on a root stock sufficiently compatible to accept it, for the purpose of propagation. Methods vary, each nurseryman having one or more which he prefers, but the principle is always the same.

Scionwood may be cut the fall before grafting is to be done, after the growing season has ended, but some prefer to cut the scions in early spring. This means that the scions must be stored until time to graft, and correct storage is so important that nurserymen make elaborate provision for it. I have found that keeping scions underground in a Harrington graft storage box is the safest method. An illustration of this box is given, with directions for its construction and location. A small quantity of scions may be kept in an icebox (not a mechanical refrigerator), by cutting them into convenient lengths of one or two feet, dipping them in melted beeswax, wrapping them in tar or asphalt paper and placing them close to the ice. They will remain in good condition for several months if there is always a good supply of ice. Care must be taken in dipping the scions in melted wax, for if the wax is too hot it will injure the buds. It should never become so

hot that it smokes. I find it advisable to keep an unmelted piece of wax in the liquid wax to hold the temperature down.

Page 69

Another method of storing scions, after they have been dipped in beeswax, is to place them on the earth of a cellar floor and cover them with a few burlap sacks. They should never be allowed to become wet or they will start to mold. If they are to be stored in this way, a watch must be kept for mice which will molest them and destroy them if they have an opportunity.

Although bud wood may be stored in any of the three ways mentioned, it should not be waxed. Because of this, it is more likely to deteriorate. It must be examined frequently and if mold is found, the wood should be dipped in a Bordeaux solution. After drying, it may be placed in storage again. It is a good plan to wrap bud wood in tar or asphalt paper when storing it. However, I have found that the best storage conditions for all scionwood that I have yet discovered is in the use of peat moss. Peat moss must be on the distinctly acid side in order to perform the function of storing scionwood. Most peat moss is generally acid; however the simple litmus paper test with which every high school pupil is familiar, can be made. Having acquired good acid peat moss, dampen a sufficient quantity to pack the scions in to give them liberal protection. Do not make the bundles of scionwood too large, from 10 to 20 scions in a bundle is better than a large number and much easier to handle. The moss should be prepared exactly the same as advised in storing chestnuts (see chapter for storing seeds). In this case it is not necessary to wax the scions at all. The moss should be applied by sifting it into the open spaces between the scions and a larger wad at the base of the cuttings, not at the terminal or bud ends as these would be better left unpacked. The package is now rolled into a cylinder, using tar paper or asphalt treated paper, and both ends left open. Do not use ordinary paper or wax paper as it will turn moldy. Cylinders of tar paper containing the packed scions should be placed in a damp room like a cellar with a dirt floor which is cold enough to keep potatoes and other roots in good condition throughout the winter. If the cellar is not a good storage cellar for roots and herbs it will not be good enough for the scionwood as it will be too warm generally. Neither should they be frozen solid, therefore if a good root cellar is not obtainable then these should be put in the Harrington graft box already described or placed under the sawdust in an icehouse and close to the ice. An old-fashioned ice refrigerator will also make a good storage bin, placing them close to the ice at all times.

[Illustration: Drwg by Wm. Kuehn. *Making a scarf with a plane preparatory to grafting.*]

Page 70

Selection of good scionwood and bud wood, a very important matter, is made according to definite standards. Some plants graft better if wood is used that has two seasons' growth, but, in general, wood of the current season's growth is used. It must have reached its maximum possible maturity before it is cut. Also, some attention should be paid to the vigor of the growth which it has made during the season. For instance, in choosing between wood which has made only two or three inches' growth and that which has made a foot or more of growth, both being equally sound and mature, the more vigorous should be chosen. Attention should be paid to the development of the buds, which should be plump and never immature.

It is advisable to label scions before they are stored to avoid the confusion that will result if they are mixed. I find that the best method of doing this is to get a sheet of zinc, from 20 to 30 gauge thick, and cut it into strips one inch wide by one and three-quarters inches long. I bore a small hole in one corner of each tag, through which I thread 18-gauge copper wire, doubled and with the bottom loop folded over (see page 40). In preparing these tags, it is important to remember that both wires must pass through the hole in the metal tag, otherwise, the slight movement due to winds will cause the metal to wear through. Two wires prevent this action indefinitely. Since a small wire cuts through a zinc tag in one or two years, heavy wire must be used. Wire such as I have indicated is satisfactory. I print the necessary information on each tag with a small, steel awl, and such labels are still legible after twenty-five years. Copper, brass or aluminum would also make good tags, but these metals are more expensive. Of course, these tags may be used for small trees as well as grafts and scionwood and it is always well to do a good job of labeling all work, since many errors may result from disregard to this important detail.

In the north, the time to graft nut trees is when the cambium layer of the host, or stock, is active, which is usually during the entire month of May. This cambium layer consists of those cells lying just inside of the outer bark, between it and the woody part of the tree. When these cells are active, the inner side of the bark feels slippery and a jelly-like substance can be scraped from it. Although this is the state in which the stock should be for grafting, the condition of the scions should be almost the opposite, rather dry and showing no signs of cambium activity. The bark should cling firmly to the woody part of the scions, whereas the bark of the stock should slip off readily. Another good and fairly satisfactory rule is never to graft the stocks of nut trees until after the young leaves appear.

Page 71

In grafting young nursery trees not more than an inch in diameter, the whole tree is cut off at any distance from the ground convenient to the nurseryman. Sometimes they are cut within a few inches of the ground, sometimes two or three feet. In my work, I like to keep the scions as high above the ground as I can. When the top of a stock is cut off, there is a great deal of sap pressure and the tree bleeds. It is a poor policy to attempt grafting while this is happening. Rather, one should cut the tops off, then wait for several days before inserting any grafts. Tools must be kept very sharp. A good grafting knife is sharpened on one side only, so that the blade is flat along the side which lies next to the cut made on the scion when it is trimmed. If unaccustomed to handling a knife, one can obtain more accurate results by using a small plane. I do this by holding the scion firmly in my right hand and pulling it toward me, against the cutting edge of the plane which is held in the left hand. Illustrations show how this is done.

The only disadvantage in using a plane is that one must exchange it for a knife to make the receiving cut in the stock before inserting the graft. This necessitates exposing the graft to the air for a longer time than does using a single instrument.

Spring budding is done during the same period as grafting. Bud wood is usually much larger in diameter than scionwood, for it is easier to remove buds from big branches than from wood only one-quarter inch in diameter. When budding is to be done, take along only enough wood for half a day's work, leaving the rest safely stored. A piece of wood having a bud is prepared as shown in the illustrations "A" and "B" (next page). A T-shaped slot is made in the stock to receive the bud, a process called "shield budding." This is tied in place with either string, raffia or gummed tape, as shown in "C" and "D" (next page). The bud must be free to grow, and although it may be covered completely with wax, no part of the binding material should be close to it. Since it is not necessary to cut off all the tree in budding, enough of it may remain above the bud to brace the shoot that develops. Later, it may be necessary to cut back the tree to the bud so that a callus will form and cause the wound to heal properly.

[Illustration: Drwg by Wm. Kuehn *Shield Budding.*]

Best results are obtained when a graft union is coated with melted beeswax. Another and cheaper wax may be made by combining four parts of rosin, one part of beeswax and one-sixteenth part of raw linseed oil. To this is sometimes added a little lampblack to color the mixture so that it can be seen on the graft. Again, care must be taken to prevent injuring the cells with wax that is too hot.

I have used many kinds of tying materials, but the one which gives me best results is gummed tape, which preparation I describe in another chapter. By wrapping it in spirals around a graft union, I have a material which holds the graft in place and at the same time excludes air. The rubber also seems to encourage the formation of that tissue which unites the stock and scion. In addition to tape, melted wax should be brushed into those crevices and cracks which always occur in making a graft.

Page 72

It is usually advisable, although not necessary, to shade new grafts. To do this, cover them with light-colored or white paper sacks. Never use glassine alone for it causes the grafts to overheat and so destroys them. Whatever tying material is used, either to fasten on these bags or to support the grafts, it should be inspected at intervals during the summer, as it may constrict the graft or stock and injure or cut off the cambium.

After a scion begins to grow, it must be firmly braced against the force of the wind, for a heavy gale can rip out grafts made years before. Laths make good braces for growing shoots. They may be attached to the main branch by stout waterproof twine such as binder twine, and the growing graft tied with soft muslin strips to the lath. As the graft grows more muslin strips should be used to keep the excessive growth anchored to the lath. Grafts will often make three or more feet in growth in one season.

It is important to remember that sprouts or buds which start from the stock must be rubbed off. If they are allowed to flourish, they may prevent the scion from growing. When working over a tree several inches in diameter, it becomes an art to keep the tree stock satisfied, yet to encourage the growth of the scions. In large trees, a few sprouts must grow to nourish the root system, but this is not necessary if the stock is one inch, or less, in diameter.

Chapter 17

GRAFTING TAPE VERSUS RAFFIA

It is necessary that a person who is grafting trees and developing hybrids experiment not only with the plants he is interested in, but also with the equipment and materials he uses. For more than twelve years, I used raffia to tie the grafts I made, becoming more annoyed and irritated with its limitations each year. Finally, I began trying other materials, until I found one which I think is very satisfactory. This is a rubberized grafting tape.

At my nursery, we make our own tape. We buy pure rubber gum, known as Lotol NC-356, from the Naugatuck Chemical Company, at a cost of $7.50 for five gallons, F.O.B. their factory. With this, we use unbleached muslin of an 80 x 80 mesh, or finer. As the muslin is usually a yard wide, we fold it and take it to a printing firm, where, for a small charge, it is cut into both one-half and three-quarter inch strips by being fed through a paper-cutting machine. We use the wider strips for heavy work on large trees which have three to five-inch stubs; the narrower strips we use in the nursery, grafting young seedlings.

First, pour about a gallon of the rubber compound into a twelve or sixteen-quart pail having a smooth, rolled edge. Next, separate a dozen or so of the strips of muslin. Then, set out a pair of rails on which to dry the tape after it has been dipped. I make

these rails by using two 1” x 2” boards about twelve feet in length, nailed together at the ends with boards two feet long. This frame, resting on carpenter’s horses or benches, makes a good drying rack.

Page 73

Holding a piece of tape by one end, submerge it in the rubber solution, forcing it down with a spatula or knife. Swishing it around or moving it up and down several times helps to fill the pores with rubber. Drag it from the solution by pulling it sharply over the rolled edge of the pail, using the spatula on the upper side of the strip to scrape off superfluous rubber. A little practice soon enables one to judge the amount of rubber needed on the tape. There should not be so much that it drips off. Hang the tape on the rack so that the ends are attached to the rails, the tape sagging slightly in the center. Space the pieces of tape so that they do not touch, for, if they do, they will be very difficult to separate later. After they have dried for twenty-four hours, wind the tape on pieces of cardboard about one foot square, being careful not to overlap the tape. The tape is now ready for field-work.

I want to mention some of the advantages I have found in using this rubberized tape rather than raffia. The tape is uniform throughout and is stronger than raffia. It does not fly around and frequently get tangled as the latter does. There is no necessity for keeping it slightly damp to be usable. It may easily be torn off at any convenient length or it may be cut without injuring the edge of the grafting knife. A last advantage is that it is self-sealing since it overlaps on itself slightly when wound around a graft union. Because of this, there is no necessity for painting the finished graft with melted wax as is absolutely vital when using raffia. Personally, I use wax in addition to the tape for I feel that it is probably safer with that extra protection. Also it gives me an opportunity to wax over the tip end of the scion when it is devoid of a terminal bud.

The only disadvantage in using tape is its cost which, I must admit, is very much higher than that of raffia. But if, by using tape, twice as many grafts can be made each day, and if the resulting takes are 50% better, as they have been in my experience, then the cost is justified and raffia is actually the more expensive to use.

Chapter 18

EFFECTS OF GRAFTING ON UNLIKE STOCKS

It is unquestionably a great shock to a tree when 90% of its top is cut off. If it is healthy and vigorous, the root system will try to recover, using every means possible to do so. If a new top is grafted to it, the stock must either accept and nourish that foreign and sometimes incompatible new part, or give up its struggle for life. Nature and the tree stock usually accept the challenge and the graft begins to grow. In an attempt to continue with its own identity, the stock will bring into activity adventitious buds. These are tiny microscopic buds imbedded in the bark of a tree that are not apparent to the eye but are nature’s protection against destruction of the individual plant. But these must be removed by the horticulturist to insure proper nourishment of the grafts.

Page 74

Because the root system is striving hard to live, and because it is usually the stronger, it may force the top to accept certain of its characteristics. Occasionally, it may assume some qualities of the original top. Such cooperation is necessary if either is to survive. First of all, the grafted scions must accept the vital quality of climatic hardiness, a powerful factor developed through ages spent in a certain climate. To hasten the acclimatization of a tender variety, I cut scionwood from such unions early in the winter, storing it until spring. When these scions are grafted on new root systems, I find that they are much more readily accepted than the first grafts were. The following season, I allow the grafts of this later union to go through their first winter of exposure. Early each spring I continue to cut scions from the most recent unions and graft them to new root systems, so hastening and setting the factor of hardiness through frequent asexual propagation.

Because my observations of the effects of scion on root and vice versa, have not extended over a sufficient period of time, I think it is possible that the changes I have seen may be only transient. In any case, I do know that the phenomenon occurs, for I have seen many examples of it.

One instance in which the stock was apparently affecting the scions, occurred in the case of several varieties of black walnuts which had been grafted on wild butternut stock over a period of sixteen years. The walnut top flourished but tended to outgrow the butternut, so that the caliber of the walnut was greater than that of the stock a few inches below the graft union. I also noticed that, although the graft began to bear about as early as black walnuts do when they are grafted on their own species, the nuts did not mature at all during the first few years of bearing. In 1938, after a favorable season, I found mature nuts on one variety, the Thomas. These nuts varied in size more than they do when grafted on black walnut. The most surprising thing about them, though, was that they did not have the characteristic black walnut flavor. When properly dried and cured, they could have passed as an entirely different nut since they tasted like neither the black walnut, the butternut nor the Persian walnut.

The overgrowth of the Ohio black walnut, grafted on butternut, was even more apparent than that of the Thomas. These nuts were, as I have said, immature the first few years they appeared and they, too, lacked the usual black walnut flavor. In their case, however, the most striking change was in the shape and structure of their shells which were elongated like butternuts, with corrugations typical of those found on butternuts and nearly as deep and sharp. (See Illustration in Chapter 1, Page 5.)

Page 75

In 1937, I made experimental graftings on native black walnut stocks of the Weschcke No. 4 butternut, a variety I found to be superior to hundreds of other native trees tested. The grafts grew luxuriantly and in 1940, produced about two pounds of nuts. These nuts were approximately 30% larger than those on the parent tree. They cracked well and the kernels were similar to those from the parent tree. They definitely distinguished themselves, however, by being a free-hulling nut, which is not true of the mother tree nor of most butternuts. Soon after the nuts had dropped to the ground and were still green, they were hulled and their hulls peeled off like those of the Persian walnut, leaving the nuts clean and free from remnants. Apparently this phenomenon was a transient one since later crops did not display this free-hulling feature.

I have mentioned, elsewhere, the seedling apricot which came into bearing in St. Paul, and how I obtained grafts before it died during a very cold winter. I have grafted scions of this apricot on both hybrid and wild plum stocks repeatedly and this apricot now exhibits a material gain in hardiness. It overgrows the plum stock, but this does not seem to inhibit its bearing, the fruit growing to greater size than that of the mother tree.

These are some of the instances in which I have seen stock exert a definite, and, mainly a beneficial influence on its grafted top. It may easily be that these are only of a temporary nature and until I have seen them maintained for many more years, I must consider them to be transient effects.

Chapter 19

DISTINGUISHING CHARACTERISTICS OF SCIONS

Loss of identification markings from my grafted trees has, on occasion, caused me much confusion. There was one time when I had from six to ten varieties of hickories and their hybrids grafted on wild bitternut hickory stocks, totally lacking in identification. Although this disconcerted me considerably, I knew of nothing I could do except to wait for the grafts to bear nuts and determine the varieties from these. As I continued my experimental grafting, I made sure that the tags I used were not only indestructible, but also secured to the grafts in such a way that the action of the wind could not wear them out nor cause them to drop off.

Not long after this had happened, I received from Dr. Deming a shipment of about twenty varieties of hickory scions. While I was preparing this material for grafting, I noticed that each variety could be readily distinguished by its appearance in general and, specifically, by differences in its leaf scars. I also noticed markings on the bark, particularly the stomata, which differed with each variety. Color and stripes added further differentiation. Although I also found variations in the size and shape of the buds, I later discovered that these do not always remain constant within a variety, but depend somewhat on each season’s growth. For instance, a second growth sometimes

develops during a favorable season with a large number of lateral buds growing out of it like spines.

Page 76

It seemed to me that if scions could be maintained in an approximately fresh state, they would furnish a key by which any variety of graft could be determined as easily as it could by its nuts. I therefore set myself to preserve scionwood in its fresh state. First, I cut five-inch pieces of plump, healthy wood, each piece having a terminal bud. I placed these buds downward in large test tubes which I then filled with pure, strained honey. Such models did very well for a time, but after about a year, the honey crystallized and of course the scions were no longer visible. I emptied the tubes and washed them, cleaned the scions in warm water, replaced them and refilled the tubes with pure glycerine. I submerged a thin, zinc tag, stencilled with the varietal name and bent to conform with the contour of the tube, inside of each one as a name plate which could not easily be lost or removed. I also labeled each cork with the name of the variety enclosed so that any one of them could be located when looking down at a nest of tubes in a vertical position.

In order to display these preserved specimens at illustrated lectures, I had a rack made of redwood, of a size to hold twenty tubes. The tubes could easily be taken from the rack for closer observation by members of an audience. I find this to be an interesting adjunct to various nut culture exhibits I make in trying to promote nut culture education.

Since I was able to identify my unlabeled, hickory grafts by means of this catalogue of submerged scions, I consider it of great practical worth. At the present time, I have about 50 hickory specimens, a good catalogue, although not a complete one. I see no reason why the same thing could not be done with black walnut or any other kind of nut scions.

Chapter 20

HYBRIDIZING

Working with nature to develop new varieties of trees is fascinating although it requires infinite patience and study combined with skill and concentration. A person without experience may taste of this pleasure, however, by trying his hand at cross-pollination, and there is no end to the number of hybrids possible.

In attempting to make crosses, one must necessarily understand the botanical relationship between the trees to be crossed. Trees of the same species cross readily in almost all cases; trees of the same genus are not as easily crossed; trees belonging only to the same family are usually difficult to cross. It is generally assumed that trees not in the same family are impossible to hybridize. The plum serves as a practical example of this. The American wild plum crosses readily with almost any other plum and particularly well with the Japanese plum. These crosses have resulted in such phenomenal fruit as the Underwood plum, a cross made between species. If a cross were made between a chestnut and a walnut, it would be between members of different

families. I recommend to anyone who is attempting to cross-pollinate for the first time, that he limit his work to crosses made within species. His chances of success will be greater and such success added to the experience he is acquiring, will give him the background needed for more difficult hybridizing.

Page 77

Crosses made between filberts and hazels usually produce great changes in the resulting fruit. J. F. Jones won considerable horticultural fame from crosses he made between the wild American hazel known as the Rush hazel, and such varieties of the European filbert as the Italian Red and Daviana. Hazel and filbert cross readily and the resulting seedlings will usually bear after only three or four years. For both these reasons, they are good material for a beginner to work with. If the wild hazel is to be used as the female, or mother, of the cross, it is necessary to pick off all the male blossoms, or staminate blooms. This should be done long before they begin to expand. The pistillate, or female blossoms, should be enclosed in bags, about six of the three-pound, common kraft bags should be enough. These are slipped over those branches which bear female blossoms and are tied around a heavy packing of absorbent cotton, which has been wound around the branch at approximately the place where the opening of the bag will be. In fastening the mouth of the bag around the cotton, I find that No. 18 copper wire, wrapped several times around and the ends twisted together, is more satisfactory than string. This makes a pollen-tight house for the pistillate blossoms but not one so air-tight as to cause any damage to either the plant or blossoms.

In order to have pollen available at the proper time, it is necessary to cut a few filbert branches which bear staminate blooms and store them in a dark, cold place to prevent the pollen from ripening too soon. I recommend keeping such branches in dampened sphagnum moss until it is time for the pollen to ripen, or if a cold cellar is available, burying the cut ends of large branches carrying male catkins one foot deep in clean, moist sand. When the pollen is wanted, the branches should be placed in a container of water and set near a window where sunlight will reach them. Usually, after one day of exposure to bright sunlight, the staminate blooms will expand and begin to shed their pollen. The pollen may easily be collected by allowing an extended catkin to droop inside a vial or test tube and then, as the catkin rests against its inner wall, tapping the outside of the tube sharply with a pencil to jar the pollen grains loose. A separate test tube must be used for each variety of pollen to be experimented with. By following this procedure for several days with all the staminate blooms that have been gathered, the experimenter should have enough pollen for work on a small scale. The test tubes containing this pollen should never be stoppered with corks, but with plugs of absorbent cotton, which will allow the passage of air. Pollen may be stored in this manner for several days, possibly as long as two weeks, if it is kept dry. By a close observation of the blooming period of the wild hazels, one is able to determine the best time for placing the filbert pollen on the pistillate blossoms.

Page 78

No attempt should be made to do so until the male catkins of the wild hazel species are so entirely exhausted that no amount of shaking will release any grains of pollen. When this condition exists, it is time to move the stored filbert branches to strong sunlight. A quiet day should be chosen to pollinize the hazels for two reasons. If there is a wind, it will blow away the pollen and so make the work more difficult. A wind will also increase the danger of the hazels being fertilized by native hazel pollen which may still be circulating in the air and which the flowers may prefer to filbert pollen.

When good conditions are present, then, the hybridizer proceeds to his work. A brush with which to transfer pollen from the vial to the pistillate blossoms is made by wrapping a little absorbent cotton around the end of a match. The paper bag is removed from around a group of hazel blossoms, a small amount of pollen is dabbed on each blossom and the bag is immediately replaced, to remain on for two more weeks. When the bags are finally taken off, the branches should be marked to indicate that the nuts will be hybrids. Before receiving pollen, each pistillate blossom has, emerging from its bud tip, a few delicate red or pink spikes which are sticky enough to make pollen adhere to them. Within a few days after receiving pollen, these spikes may dry up and turn black, a fair indication that the pollen has been effective. If the pollen does not take hold, the spikes of the staminate blooms are sure to continue pink for a long time. I have seen them in the middle of the summer, still blooming and waiting for pollen which would let them continue on their cycle. This ability of hazel flowers to remain receptive for a long period allows the nut-culturist ample time to accomplish his work. It is not so true with all members of the nut tree group, some, such as the English walnuts, being receptive for such a short period that only by very frequent examination and many applications of pollen can one be sure of making a cross.

Early in the fall, the hybrid nuts should be enclosed in a wire screen to prevent mice and squirrels from taking them before they are ripe. Such wire screens may be used in the form of a bag and fastened around each branch. When the husks turn brown and dry, the nuts are ripe, and ready to be gathered and planted. Careful handling of the nuts is advisable to preserve their viability. They should be planted in an outdoor bed which has been fully protected against the invasion of rodents. A screen such as I described for other nut seed is satisfactory for these hybrid nuts but it need not be as large as that. After the nuts have sprouted and the plants have grown for one season, they may be transplanted into a permanent location where they should again be well protected against mice by a trunk screen, and against rabbits by driving a stout stake deep into the ground on the south side of the tree and tying it to the tree. This use of a stake discourages rabbits from cutting off the tree.

Page 79

There are innumerable other crosses that can be made as well as those between hazels and filberts. It is possible, for example, to cross the English walnut with the black walnut. Many such crosses have been made although none of them is known to have produced superior nuts. Thousands of crosses exist between butternuts and Japanese heartnuts. Many of these are of some worth and are being propagated. Crosses between heartnut and butternut are easily made, following the same procedure used in crossing hazels and filberts, except that larger bags are necessary for covering the female blossoms. Also, these bags should have a small, celluloid window glued into a convenient place, so that the progress of the female blossoms toward maturity can be observed.

When hybridizing walnuts, it is necessary to use a pollen gun instead of removing the bag from around the female blossoms and applying the pollen with a cotton-covered applicator. Such a pollen gun can be made by using a glass vial which does not hold more than an ounce of liquid. An atomizer bulb, attached to a short copper or brass tube soldered into a metal screw-cap, is fitted to the vial. Another small copper or brass tube should also be inserted in the screw-cap close to the first one. The second tube should be bent to a right angle above the stopper and its projecting end filed to a sharp point. Without removing the bag from around the pistillate blossoms, the hybridizer forces the point of the atomizer through the cotton wadding between bag and branch. The pollen in the vial is blown through the tube into the bag in a cloud, covering all the enclosed blossoms. It is advisable to repeat this on several successive days to make certain of reaching the female blossoms during their most receptive period.

[Illustration: *8 x 8 x 8 foot tightly woven sheet of unbleached muslin stretched over mother hazel plant during pollination period in the process of making controlled crosses between it and filbert parents. Photo by C. Weschcke.*]

[Illustration: THE WESCHCKE POLLEN GUN

Taper end of copper tube ... not absolutely necessary, but it saves pollen.

Long fibre cotton wad wired to intake side of bulb to strain out foreign pollens that may be in atmosphere.

De Vilbiss atomizer bulb.

Pollen grains

Any small glass bottle with a wide mouth and screw cap.

Tubes A and B—3/16” outside diameter copper tubing can be purchased at any garage. Solder both tubes to screw cover C.

Drwg by Wm. Kuehn

How to make pollen gun.]

Chapter 21

TOXICITY AMONG TREES AND PLANTS

Page 80

Although quack grass will grow luxuriantly up to the trunks of both black walnut and butternut trees, I know, from things I have seen myself, that the roots of the latter and probably of the former have a deadly effect on members of the evergreen family. I have seen northern white pine and other pines, too, suddenly lose their needles and die when, as large trees, they have been transplanted to the vicinity of butternut trees. To save as many of these transplanted trees as possible, it was necessary for me to sacrifice almost one hundred fine butternut trees by cutting them off close to the ground and pruning all the sprouts that started.

Other instances have also demonstrated to me this deleterious power of butternut trees over evergreens. For years, I watched a struggle between a small butternut tree and a large Mugho pine. Gradually the Mugho pine was succumbing. At last, when the pine had lost over half its branches on the side near the butternut, I decided to take an active part in the fight. I cut off the trunk of the butternut and pruned off all of its sprouts. The butternut surrendered and died. The Mugho pine took new heart, lived and again flourished.

At another time, I transplanted several thousand Montana pines, about thirty or forty of which came within the branch limits of a medium size butternut tree. Within a year, these thirty or more trees had turned brown and were completely dead, while those immediately outside the branch area were dwarfed and not at all thrifty. The trees farther from the butternut were unaffected and grew consistently well. A similar condition, although not to the same degree, developed under a white oak where more Mugho pines were growing. Another instance occurred when a planting of several thousand Colorado blue spruce were lined out and fell within the area affected by two butternut trees. The spruce were all dead within a few months.

Many people have observed the detrimental effect of trees of the walnut family on alfalfa, tomatoes and potatoes, resulting in wilting and dying. It is the root systems of the walnut which are responsible for this damage. Apparently, there is some chemical elaborated near the surface of the roots, and sensitive plants, whose roots come in contact with either roots or ground containing this factor, are injured and sometimes killed by it. One must therefore be very cautious about trusting these trees as protectors of many of the ornamental and garden plants. I am certain, from my own observations, that their influence on evergreens is strongly antagonistic.

On another basis is the association between catalpas and chestnut trees growing adjacent to one another. Constructive symbiosis apparently develops when a young chestnut tree is planted within the radius of the root system of a catalpa. The latter very definitely influences the chestnut tree to grow more vigorously than it otherwise would.

Page 81

I have recorded my observations of these antagonisms and friendships between trees and plants to show that they are a reality which should be taken into consideration in grouping and transplanting. Such warnings are infrequent because some people may mistake them as condemnations of certain favorite trees. I do not intend them as such, for these plants are often valuable and worthwhile. This ability which they have developed through the many years of their existence is a guarantee of the sturdiness and strength of their family and species, not at all a quality to be condemned.

CONCLUSION

If I had written this book twenty years ago, I would have prophesied a future for nut culture in the north, full of wonder, hope and profit. If I had written it ten years ago, I should have filled it with discouragement and disillusion. Now, after growing such trees for more than 30 years, I realize that the truth lies somewhere between these extremes, but nearer the first.

It is seldom practical to move native trees very far from their natural range, nor is it necessary to do so in this part of the north: We have four fine, native nut trees: the hazel, the butternut, the black walnut and the hickory. In my experience, these four have completely demonstrated their practical worth.

If commercialization is the primary hope of the nut tree planter, he should first consider the large, hardy hybrids, known as hazilberts, which I have produced between a large Wisconsin wild hazel and European filberts. Hazilberts equal the best European filberts in every way, without the latter's disadvantage of susceptibility to hazel blight and its lack of hardiness. They are as hardy as the common wild hazel and are more adaptable to environment and soil conditions than any other native nut tree. They may be trained into trees or allowed to grow as large bushes. Like all other filberts and hazels, they, too, need companion plants for cross pollinization to obtain full crops of nuts.

The butternut is also a very adaptable tree. No one who is acquainted with it, questions the quality of the butternut kernel. In a good variety, the nuts should crack out in halves and the kernels drop out readily.

So many good varieties of black walnuts are being propagated, I need not say much about them, except that many of the best ones are not practical for this climate. Nurserymen who grow them can give the best advice about varieties to anyone selecting black walnuts for orchard planting.

Hickories are the last of these native trees to be recommended from a commercial standpoint, as they are the most particular about soil and climate. However, with

improved propagation methods and planting technique they should become some day as valuable as pecan plantations have become valuable to the south.

Considering the nut tree as a dooryard tree, an ornament rather than a business, makes it possible to include many more species as suitable for growing in the north. For this purpose, I suggest heartnuts, chestnuts, pecans and hiccans. The heartnut tree is always one to draw attention and interest, picturesque in its leaves, blossoms and clusters of nuts.

Page 82

Last, but certainly not least in it potentialities, is the English walnut. I am certain that we shall have some varieties of these which will be hardy enough to plant in the north. When these have been completely proven, they will be a delightful addition to the number of trees flourishing here. What family would not receive enjoyment and satisfaction from having, in its dooryard, a gracious English walnut tree, its spreading branches laden with nuts?

Although the commercial aspect of producing hazilberts is engrossing me at the present time, my greatest pleasure in nut culture still comes, as it always shall come, from actual work with these trees. It is both a physical and mental tonic. I recommend nut tree culture to everyone who enjoys spending his time out-of-doors, who is inspired by work of a creative nature, and who appreciates having trees, or even one tree, of his own. Suggested reading on Nut Tree Culture:

Nut Growing by Morris
Nut Growers' Handbook by Bush
Tree Crops by J. Russell Smith
The Nut Culturist by Fuller
Improved Nut Tree of North America by Clarence Reed
Annual Reports of N.N.G.A.