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H. R. Varney

Science Serves Your Farm

Bulletin 349, Part I (Winter Issue) December 1951

OAK WILT

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AGRICULTURAL EXPERIMENT STATION WEST VIRGINIA UNIVERSITY

Science Serves Your Farm

Bulletin 349, Part I | Winter | December 1951

ANNUAL REPORT OF H. R. VARNEY, DIRECTOR
WEST VIRGINIA UNIVERSITY AGRICULTURAL EXPERIMENT STATION
FOR THE PERIOD 1950-1951

IN THIS ISSUE

JANUARY

7-11, Eleventh Annual W. V. U. Dairy Short Course—Jackson's Mill
10, 30th Annual Meeting, Dairymen's Assn.—Jackson's Mill

FEBRUARY

Annual Tour, State Horticulture Society
28, Annual Meeting, Upper Ohio Valley Horticulture Association
Hampshire County School
State Nurserymen's Association

APRIL

8, 9, 10, West Virginia Farm Electrification Conference—Jackson's Mill
10, State Section, American Society of Agricultural Engineers—Jackson's Mill

SPRING

State Garden Club

JUNE

Wardensville Agronomy Field Day
25, Dairy Day, Morgantown

JULY

16, Agronomy Field Day, Pt. Pleasant

Note: Some exact dates are unavailable. These will be announced in press and radio releases.

Personnel Changes

F. D. Cornell, Jr., Assistant Dean and Director, died August 29, 1950. He had served in the University since 1921 and was a member of the Station staff since 1929.

Dr. Cornell received his Master's Degree and PhD from Cornell University. He came to West Virginia University in 1921 as instructor in Agricultural Engineering. He was appointed Assistant Director on July 1, 1945, and Acting Dean and Director on July 1, 1949. He held the latter post until February 28, 1950.

Dr. Cornell's new apointment as Associate Dean and Director was to have taken effect on September 1, 1950.

A. H. VanLandingham, agricultural biochemist, was appointed Assistant Dean and Director on October 1, 1950.

New appointments within our research staff since July 1, 1950 include G. C. Anderson, associate animal husbandman; Jack O. Cantrell, assistant in silviculture; H. W. Fairchild, assistant agronomist; Walter D. Foster, associate agricultural statistician; John F. Fulkerson, plant pathologist (Kearneysville); W. S. Hutson, assistant in agricultural economics; V. K. Johnson, assistant animal husbandman; W. L. Kjelgaard, assistant in agricultural engineering; Christian B. Koch, assistant in forest utilization; Leo Kotchek, assistant animal pathologist; Walter R. Lewis, agricultural biochemist; Mason B. Marvel, assistant in horticulture; Stanley J. Nels, assistant editor; Robert W. Parker, research assistant in forestry; I. D. Porterfield, associate dairy husbandman; James T. Reid, assistant in agricultural engineering; W. H. Reid, associate forester; and John R. Warner, assistant in forestry.

During this same period the following have resigned: E. R. Baker, Jr., assistant in agricultural engineering; Newton M. Baughman, assistant in agronomy; Ronald P. Bird, cooperating aft., agricultural economics; J. D. Downes, Jr., assistant in horticulture; C. A. Flanders, assistant agricultural biochemist; Clinton B. Gregory, assistant in bacteriology; R. L. Henrickson, assistant animal husbandman; George Hyatt, dairy husbandman; J. B. Huffman, assistant in forestry; Glen V. Longacre, research assistant in forestry; G. G. Marra, associate forester; Blair M. Ritter, assistant in agronomy; Guy H. Stewart, assistant editor; Sam Stregevsky, assistant agricultural biochemist; C. F. Taylor, plant pathologist; and W. J. Tyler, dairy husbandman.

New Publications

Bulletins

342. Biennial Report of H. R. Varney, Director. Science Serves Your Farm. September 1950.

343. Collins Veatch. Forage Crop Trials in West Virginia. November 1950.

344T. Torkel Holsoe. Yellowpoplar: Reaction to Crown Release and Other Factors Influencing Growth. June 1951.

345. T. B. Clark, H. M. Hyre, C. E. Weakley, Jr., and A. H. VanLandingham. West Virginia Limestone — A Calcium Supplement for Poultry. August 1951.

346. H. M. Hyre. Selection for Viability in White Leghorns. September 1951.

347. M. G. Brooks. The Effect of Black Walnut Trees and Their Products on Other Vegetation. October 1951.

348. M. E. Gallegly, Jr., and J. G. Leach. Simplification of Garden-Pest Control. November 1951.

Circulars

82. Earl H. Tryon, Allen W. Goodspeed, R. P. True, and Carl J. Johnson. Christmas Trees — Their Profitable Production in West Virginia. June 1951.

83. Martha E. Plonk and Ruth D. Noer. Farm Home Business Centers. August 1951.

69. (Revised) W. H. Childs. Growing Grapes in West Virginia. September 1951.

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SCIENCE SERVES YOUR FARM will be sent free to any resident of West Virginia in response to a written request to the Director, Agricultural Experiment Station, West Virginia University, Morgantown, W. Va.

OAK WILT

What Does It Mean?

by R. P. TRUE

LEAVES showing oak wilt symptoms. Dying portions (marked A) are at first a dull water-soaked green color as in leaf at left. Later they become light brown as in leaf at right. Basal portions (B) are a normal shrimp green. In nature there is a sharp contrast between the colors of A and B where they come together.

AN IMPORTANT DISEASE of oaks and chinese chestnuts, thought to be confined to the Middle West until last year when it was discovered in Ohio and Pennsylvania, has this year been found in West Virginia as well as in Maryland, Virginia, and other neighboring states.

This disease affects all oak species, usually killing members of the red oak group (species with spine-tipped leaf lobes) in one or two years and white oak relatives (with rounded spineless lobes) in from three to five years. Its importance in the Middle West has been recognized since 1942 when Dr. Berch Henry, a student from West Virginia at the University of Wisconsin, described the disease and named the fungus that he found causing it *Chalara quercina.* Since that time, investigators in the Division of Forest Pathology of USDA and researchers in Wisconsin, Iowa, and Illinois have studied the disease and its effects.

Description of Fungus

The fungus causing this disease lives in the wood vessels of the outer rings of sap wood just underneath the bark where both the mycelium and spores have been found. Here it seems to produce a toxic chemical that causes the leaves to become at first slightly cupped, then partially dull green and watersoaked, and finally partly or completely browned. Affected leaves may fall at any stage of symptom development. Leaves that are only partially water-soaked or brown in color show a sharp contrast between the abnormal colored areas and the normal green portions that are usually confined to the basal portion of the leaf. Some leaves will hang onto the branches so that the treetop comes to have a thin crown of brown leaves that makes it easy to see from an airplane or against a hillside of normal green trees. The crowns of such trees look similar to those of trees that have been girdled, poisoned or struck by lightning. Usually, however, all or nearly all the leaves will cling to the branches of such trees, whereas considerable leaf fall will make the crowns of oak wilt trees thin and easy to see through. Partially defoliated trees or branches may produce green suckers in the fall or the following spring, but these suckers are short-lived.

Cover

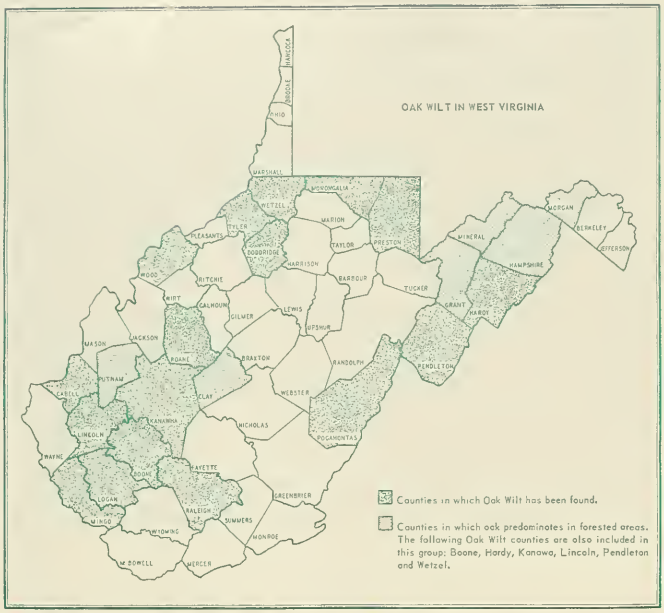
Red Oak showing Oak Wilt symptoms throughout the crown. The foliage has become thin as leaves have fallen, but enough brown wilted leaves remain to make the tree conspicuously visable from the ground or from an airplane. (Photograph by Bill Strunk of the State Conservation Commission; leaf picture also by Strunk.)

Symptoms

In the red oak group the symptoms appear first in the top of the tree and rapidly spread downward to involve the whole crown. In white oaks, symptoms are more localized. Usually only one or two large branches die the first year and the disease spreads more slowly; several large dead branches usually showing conspicuously before the tree dies. Early severe pruning of white oaks may rid them of the disease, but the fungus is already widespread through the red oaks before symptoms appear in any part of the crown.

Many of the symptoms described here are characteristic of other diseases of oak beside oak wilt, so it is not safe to diagnose this disease on the basis of symptoms alone. The Plant Pathology Department of West Virginia University makes cultures from samples of diseased oak since only after a microscopic examination can one determine if the oak

R. P. TRUE is Associate Plant Pathologist and Associate Professor of Plant Pathology.



wilt fungus or some other agency is causing the symptoms.

How to Sample Trees

Samples suitable for culturing and diagnosis may be collected in the following manner:

Six sticks 6 to 8 inches long and 1 inch in diameter, taken if possible from six branches showing symptoms but still alive and sappy, make up an ideal sample. If none of the symptom branches is still green but completely dried out, it will be best to cut a large slab sample from the trunk 6 to 8 inches long, as wide as the axe, and 1 to 1½ inches thick at its widest part. Trunks and roots of affected trees often remain alive and sappy after all the branches die.

If there are living branches with symptoms, these are better than trunk samples — especially in the case of white oaks since the fungus may be limited to the symptom branches in this and closely related species. Please do not send in just dead or decayed wood, bark or leaves, as it is very difficult to get the fungus to grow out from such material. Please tag and number the samples to designate the tree from which they were taken.

Oak Wilt's Spread

The reason that the disease is not at once more devastating appears to be that its means of spread are limited. Unlike the chestnut blight fungus, the oak wilt fungus, *Chalara quercina*, is not known to produce abundant spores externally on affected trees. Thus wind-borne spores, which are such an important means of spreading chestnut blight, seem not to be an important factor in the case of oak wilt.

Oak wilt, however, is spread through root grafts between adjacent trees of closely related oak species and over greater distances by some agency that picks up and carries away the spores from oak wilt trees and introduces them into the wood of healthy trees growing at considerable distances. Some insects have habits that would make it possible for them to do this. Woodpeckers and several other agencies also have been suggested, but as yet the actual carrier of the disease is unknown.

Checking Its Spread

Investigators in Middle West states have suggested that the localized spread of oak wilt through root grafts may be effectively checked by severing root grafts between diseased and healthy trees by trenching. A trench 30 inches deep is reported effective for street, lawn, or park trees. Under forest conditions it has been considered more practical to poison a ring of healthy oaks around the diseased trees, since the roots of poisoned trees will not pass on the disease. To reduce the chances of spread by insects, birds or other possible vectors, prompt removal and burning of the affected trees has been suggested.

Oak Wilt in West Virginia

Since oak wilt was first discovered in West Virginia early this summer an attempt has been made to determine how serious and how widespread the disease is in the State. A survey participated in by the West Virginia University Agricultural Experiment Station, the State Conservation Commission, and the State Department of Agriculture, with valuable assistance from Federal agencies and representatives of oak-using industries within the State has shown that:

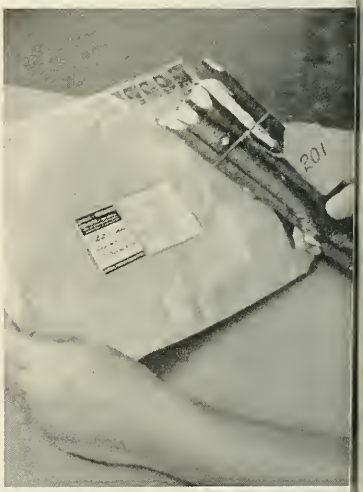
Found in 17 Counties

(1) The disease is widely scattered in the State, having been found in 17 of the 55 counties.

(2) The disease appears to have been present in some locations for more than five years before it was found.

(3) In no place has it as yet caused extensive damage to oak timber.

(Continued on Page 13)



SAMPLES from a suspected oak wilt tree as received in the laboratory for culturing. It is necessary to isolate fungus from suspected trees to be certain that they have the oak wilt disease.

SHOPPER is choosing between "long" and "square" carton. Odds are about 6 to 1 she will choose long carton.

EGGS—the homemaker's view

by Norman A. Nybroten and Ronald Bird

ABOUT 4,500 West Virginia households have been visited to determine what the homemaker thinks about certain factors important in egg marketing. Some of the people who were interviewed in their homes also have been observed in retail stores in order to learn whether their opinions were carried out in the market.

Uniform Sizing Not Important

In the home interviews, the homemaker was shown two different dozens of eggs at the same time — one sized very uniformly and the other with great variation in the sizes of individual eggs. Those sized most uniformly had much less variation in size than that allowed by federal grading standards or than would be achieved by ordinary trade equipment. Those that were not uniform in size had much more variation than would be expected in run-of-the-nest eggs at any time of the year except possibly during the very first part of pullet laying.

The homemakers were not sensitive to size variation among the individual eggs. When they were assured that the different dozens weighed the same, they would usually pick one dozen over another dozen for some other reason. This occurred even though great effort had been made to make the dozens alike in every respect other than the size variation of the individual eggs.

When asked if they cared whether the sizes of individual eggs varied if the total dozen weighed up to the claims or expectations, most of the homemakers again did not seem concerned about variation in size. The egg standards set up by West Virginia law do not set weight limits for the individual egg, but do set minimum weights for the dozen, which seems to be the important factor to the consumer.

Although consumers are not very sensitive to reasonable variation to the sizes (more correctly the term "weights") of individual eggs, it does not mean that classifying eggs by size would not pay. Research in retail store experiments and the homemaker survey shows that individual shoppers have rather definite preferences for dozens in specified weight classes despite the indifference to the weight of individual eggs. Indications are that the retailer who will cater to these preferences will sell more eggs.

Who Gets the Customer?

In general, homemakers were asked enough questions to determine what kind of eggs they prefer. They also were asked what determined where they bought their eggs. Probably the two most common answers were that they bought them where they could get "fresh" eggs, or where they bought the rest of their food supplies.

After the homemaker's preference was learned, data were gathered on what she actually bought. Although these responses have not been analyzed, a preliminary view shows that only a small percentage actually get

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NORMAN A. NYBROTEN is Station Agricultural Economist and Professor of Agricultural Economics. RONALD BIRD is cooperative agent of the Bureau of Agricultural Economics.

Potato Varieties for West Virginia

by K. C. Westover

CONCERTED EFFORT in recent years by the federal government and many of the state experiment stations has resulted in an ever-increasing number of new potato varieties. Resistance to diseases and insect pests and hardiness to adverse environmental conditions have in many instances been combined with an increased capacity to produce high yields of attractive tubers of quality.

For years the West Virginia University Agricultural Experiment Station has been conducting variety tests in which our established or "standard" varieties are compared with the "new" varieties that, from report, would seem to have a place in West Virginia production. An almost complete change in the varieties grown here has taken place in the last ten years — the Cobbler being the exception. The following varieties, in the order of their time of maturity, have given the most consistent performance under our varied growing conditions.

K. C. WESTOVER is Station Horticulturist and Professor of Horticulture.

Cobbler

The *Cobbler,* blocky and round in shape, is our most widely adapted and widely used white variety. It is an "old" variety and has a relatively low resistance to the insects and diseases that affect production most severely. Although its numerous and deep eyes decreases its popularity with the housewife, its earliness, quality, and wide adaptation in the State makes it our most reliable early sort.

Chippewa

Chippewa, one of the newer sorts, is about a week to ten days later in maturity than the Cobbler and is resistant to certain of the virus diseases. It is an exceptionally attractive white-skinned, smooth, round-flattened potato with few and shallow eyes. This variety seems to be particularly well-suited to the middle altitudes of the State, especially if planted in light, well-drained soils that are deep and fertile.

Katahdin

Katahdin is a sister variety of Chippewa. It is about a week later in maturity and possibly more resistant to certain of the virus diseases. It probably is the most widely adapted of the newer varieties and with the exception of the low altitudes, yields well elsewhere in the State. The tubers closely resemble those of the Chippewa and are generally of good quality when grown under favorable conditions. Here in West Virginia it tends to "set" its tubers high, causing them to green from exposure to the sun. Soils for this variety should be well-drained and deeply plowed and prepared to permit deep planting and a moderate hilling to provide cover when the crop is "layed by."

Sebago

The *Sebago* potato produces high yields of satisfactory market and cooking quality. It is medium late

in maturing and both the tops and tubers — the latter especially — carry resistance to late blight. Because of this the variety is recommended for use on the lower areas of sloping plantings which may become overly damp in the late season. The tubers are smooth, cylindrical to somewhat flattened and elongated, with few and shallow eyes. The skin is an attractive white and the occurrence of odd or off-shape tubers is exceptional.

Kennebec

A new, late, vigorous growing variety, the *Kennebec*, combines high-yielding capacity and cooking quality with an exceptionally high degree of late blight resistance in both vines and tubers. It has been found to be very well adapted to the intermediate and higher altitudes of the State. The tubers, when in grade, are smooth, medium long, and round-flattened. The tuber skin is an attractive white and the eyes are few and shallow. Under conditions promoting rapid growth, unless the plants are "crowded" by close planting in the row, a large proportion of the tubers tend to be large and "rough." The Kennebec promises to rapidly replace Katahdin and Sebago in West Virginia.

Pontiac

Pontiac, an attractive pinkish-red potato of Michigan origin, is especially well-adapted to the late potato sections of West Virginia. Although it has little inherent resistance to pests, it grows vigorously and appears to be hardy to inclement growing conditions. The tubers are almost round to slightly elongated and slightly flattened. They have a tendency to become moderately elongated when large and are exceptionally solid. The eyes are medium in number and depth, and the flesh is "crystal" white. When grown under favorable conditions, its quality is good and it stores well.

Menominee

Menominee, another Michigan potato, is a late potato with a flaky to moderately russeted skin that is probably better adapted to West Virginia conditions than other scab-resisting commercial varieties. Its quality is good and under favorable conditions its yields are high. The tubers are blocky — generally broader than long — and moderately flattened with a tendency to become "rough" or irregular when large. It has few eyes which are distinct but not deep. Its high resistance to scab, together with its favorable market appearance and yielding capacity, make it particularly important to growers using "scabby" soils.

Those interested in growing potatoes should recognize that, although the new varieties have outstanding characteristics of quality and appearance and are resistant to some of the factors critical to production, none of them are immune to all those conditions. The best seedstock obtainable, supplemented by an adequate pest-control program is highly essential to efficient production.

Assistant Director

A. H. VanLandingham was appointed Assistant Dean and Director on October 1, 1950. He first came to West Virginia University in the fall of 1929, as a graduate assistant in Agricultural chemistry.

Dr. VanLandingham has served as assistant chemist, associate chemist, biochemist, and head of the Department of Agricultural Biochemistry and Nutrition. While in that department he was leader on a number of research projects.

Since 1947 he has served as a member of the Technical Committee on "Nutritional Status Studies" in the Northeast Region. He also is chairman of a subcommittee on statistical methods.

A. H. VANLANDINGHAM

Liquid Manure Study

FARMERS may lose $25 annually per cow if they fail to save the liquid portion of manure!

But that's not all, for this figure is based on nitrogen loss alone. Station research workers point out that liquid manure also contains much phosphorus and potash. In fact, a farmer might save up to $50 annually per cow if he provides for proper collection and disposal of liquid manure from his herds.

On the average, liquid manure from dairy cows contains 0.8 per cent nitrogen, 1.4 per cent potash, and a trace of phosphoric acid. This means that for every 1,000 pounds of liquid manure recovered, a farmer may have about 8 pounds of nitrogen and 14 pounds of potash. Therefore, a ton of liquid manure is equivalent to 100 pounds nitrate of soda and 50 pounds of nuriate of potash.

A dairy cow produces about 8,000 pounds of liquid manure annually. If she is confined to the barn 6 months out of the year and if half of the liquid is absorbed by the litter, then 2,000 pounds exists as liquid manure.

Research on this problem is now underway at the University's dairy husbandry farm in Morgantown. The project is being conducted by the Dairy Husbandry, Agricultural Engineering, and Agronomy Departments. The Station is trying to find efficient, economical, and practical methods of collecting and distributing liquid manure.

Disposal Tank Built

A manure disposal tank was constructed by the Agricultural Engineering Department. It is made of concrete and is 12 feet long, 6 feet wide, and 5 feet deep. Liquid manure from the gutters of the main dairy barn and manure pit drains into the tank.

A 600-gallon metal tank, mounted on a four-wheel trailer, is the distributing unit. Liquid is pumped into the trailer from the manure disposal tank. The pump is operated by a 2-horsepower electric motor and is capable of pumping 200 gallons-per-minute. The trailer is towed to the fields by a tractor.

By adding various chemicals, the Dairy Husbandry Department preserves nitrogen and puts it back into the fields as a fertilizer component.

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GRASS and CLOVER growing on spoil. Research shows that spoils can be reclaimed through proper management.

STRIP MINE SPOILS--

they can be reclaimed

by H. A. Wilson

DON'T GIVE UP on that strip mine spoil!

Results of seeding of grasses and legumes by the West Virginia University Department of Agronomy and Genetics and the planting of pines and locusts by the Division of Forestry have been very encouraging. These tests show that through proper management vegetation can be established on strip mine spoil banks.

Revegetation of the miniature "bad lands" left as a result of strip mining of coal depends upon many factors. One of these is the reestablishment of soil microorganisms such as bacteria, fungi, and actinomycetes.

Some of these microorganisms are active in decomposing any plant and animal residues returned to the soil. Others make use of the waste products left by the "first decomposers" and from these waste products make available certain chemical elements for use by forage crops and trees. Still other microorganisms take gaseous nitrogen from the air and "fix" it in the soil. It then becomes available for higher plants. And still others transform ammonia nitrogen left from the decomposition of plant and animal residues to nitrates, the form used by most green plants.

Land that has been undisturbed by power shovels, draglines, and bulldozers ordinarily contains sufficient nutrients and organic matter in the top layer and has a satisfactory water-holding capacity for soil microorganisms. On the other hand, strip mine spoil is a mixture of all the material from the original land surface to the top of the coal seam and is likely to contain rocks, shale, and iron pyrites. Any original fertility possessed by the top layer consequently is hopelessly diluted by this mixing.

It is fortunate that soil conditions that are favorable to plant growth also are favorable to the growth of the beneficial soil microorganisms. Research on the revegetation of these strip mine spoil areas, by trees or forage grasses and legumes, shows that in many cases the spoil becomes highly acid, and any plants present soon die.

This increased acidity is due to a considerable extent, at least, to the action of sulfur oxidizing bacteria. The sulfur in the iron pyrites, left at or near the surface after strip mining, becomes oxidized by certain bacteria. These bacteria use the sulfur to obtain energy for their living processes and as a consequence the sulfur is combined with oxygen. This sulfur-oxygen combination in the presence of water then becomes sulfuric acid. These acid spots, as they are called, appear as moist, roughly circular areas on spoil surfaces. If one digs out the piece of pyrite or pyritic shale, usually found near the center of the spot, he finds it sour to the taste. It becomes necessary, where such acid spots exist, to allow the rain to leach through the spoil for a few years. This removes a considerable amount of the acid. Then a heavy liming generally is needed to secure a permanent cover of vegetation.

This increased acidity not only adversely affects any vegetative cover, but it also will kill practically all the beneficial microorganisms which may have become established.

A farm soil of average fertility will contain from 6 million to 60 million bacteria per teaspoonful of air-dry soil; about 6 thousand to 600 thousand fungi, and 600 thousand to 6 million actinomyces. A part of the experimental area which had leached for a few years, then limed, fertilized, and seeded to grasses and legumes, contained better than 2 million bacteria, 150 thousand fungi, and 90 thousand actinomyces.

Recent Studies Made

Recent studies have shown that where vegetation is established after fertilization and liming, if necessary, microorganisms will move in. The microorganisms capable of changing the nitrogen in the residues of plants and animals to ammonia quickly establish themselves

ACID SPOTS in strip mine spoil. These result from oxidation of pyritic shale.

H. A. WILSON is Associate Bacteriologist and Associate Professor of Bacteriology.

in the spoil material under these favorable conditions. The ammonia produced by these microorganisms is quickly oxidized to nitrite and then to nitrate indicating the presence of other bacteria of great importance to the growth of plants.

The results of investigations by the Department of Plant Pathology and Bacteriology on the microbial life on some of these same areas indicate that beneficial microorganisms also become established. These beneficial microbes plus vegetation and proper soil management will help build soil fertility into these miniature "bad lands."

Newcastle Disease

THE FIRST KNOWN case of Newcastle disease in chickens in West Virginia was diagnosed in 1947. The disease has now been found in 30 counties. These counties raise about 95 per cent of all the birds produced in this State.

Poultrymen frequently ask, "Is it dangerous to hatch eggs that come from hens that have, or have had Newcastle disease?" To clarify this question, approximately 200 hens of various ages were exposed to Newcastle disease virus. Eggs were collected daily for 37 days following exposure and incubated at weekly intervals. Chicks that hatched were placed in brooders and isolation units, and held for at least three weeks. No evidence of Newcastle disease appeared in the chicks during this observation period.

Attempts were made to isolate Newcastle disease virus from infertile eggs, dead embryos, and daily from fresh eggs and one-day-old chicks. The virus isolation trials are not complete, but results to date indicate that the virus is present in eggs during the first period of reduced egg production following Newcastle disease exposure. Although the virus appears in the eggs, it is not carried over to the chicks. If the virus is present in fertile eggs, the virus grows as the embryo develops and kills the embryo before the egg hatches.

The greatest potential danger from using eggs for hatching purposes from Newcastle disease-infected birds lies in the possible breaking of virus infected eggs in the incubator. The virus of Newcastle disease is not present in egg during the recovery period or after recovery following Newcastle disease.

Selection for Viability in White Leghorns

by H. M. Hyre

POULTRY DISEASES and their control are the most serious problems facing poultrymen today. Lymphomatosis has probably been the greatest offender during the past two decades. Leading poultry authorities agree that the financial loss from this poultry trouble would exceed $50,000,000 annually. As early as 1935 this disease caused great losses in poultry flocks in West Virginia.

Lymphomatosis appears in various forms and causes such abnormalities as big livers, enlarged spleens, tumors, lameness, blindness, and enlarged bones. Since the diseases resulted in such a huge loss to flock-owners in the State, it was deemed desirable to study the possibility of reducing death losses from lymphomatosis by selective breeding.

Selected on Family Basis

The project was started in 1938. At the beginning, mortality in the flock used for the study was about 35 per cent during the first 12 months of lay. Laboratory diagnosis showed that most of this mortality was caused by lymphomatosis.

The selection was done on a family basis. The families that lived best were used as breeders. Families that had excessive mortality during the pullet laying year were discarded. The most promising breeders were held over for more than one breeding season, and a progeny test was obtained on them. The laying house mortality results presented here cover a period of 280 days from the time the pullet laid her first egg in the trap nest.

The chart presented here shows the per cent of mortality from all causes for each of the ten years in the study. It can be seen that at the beginning of the study (1938) approximately 25 per cent of the pullets housed died during the first 280-day laying period. For the second and third years there was a slight decrease in mortality, but during the fourth year, it increased to one and one-half per cent above that of 1938. During the remaining years, there was a gradual decrease in the mortality rate. By the tenth year only 8 per cent of the birds died. During the ten-year period of selective breeding, mortality in this laying flock had been reduced to one-third of the original annual rate.

Mortality Influences Profit

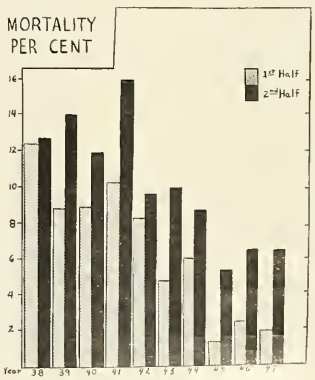
These results would indicate that laying house mortality may be reduced by selecting for livability on a family basis. Since laying house mortality greatly influences profit from the laying flock, it would seem advisable for poultry breeders to incorporate this method of selection in their breeding program.

Since trap nests and pedigree records are necessary for this type of selection, it is not practical for commercial hatcheries to do this type of selection in their supply flocks. It is possible, however, for commercial hatcheries to establish supply flocks from stock that has been improved for livability. Hatcheries could at least head their flocks with males from such breeding.

New Publication

State residents can obtain more information about this research from West Virginia University Agricultural Experiment Station Bulletin 346, *Selection for Viability in White Leghorns*, September, 1951. For a copy of this bulletin see your county agricultural agent or write to the Experiment Station, Morgantown.

H. M. Hyre is associate poultry husbandman and associate professor of poultry husbandry.



This research is being conducted by N. O. Olson, animal pathologist.

LIVESTOCK MARKETING

in west virginia

by W. S. Hutson

THE WEST VIRGINIA University Agricultural Experiment Station is cooperating with ten southern states on a research project in livestock marketing. The initial phase of this project deals with an inventory of existing marketing practices and the functions performed by the various agencies handling livestock and livestock products. Some preliminary data from a survey of West Virginia producers is presented here.

Sales by Classes

The 1950 Census of Agriculture shows that 113,694 head of cattle, 130,200 head of calves, 183,853 head of hogs and pigs, and 197,559 head of sheep and lambs were sold in West Virginia. A random sample of West Virginia farms revealed that 31.7 per cent of the cattle and calves were sold for slaughter, plus an additional 34.1 per cent sold for veal; whereas 23.1 per cent were sold for stockers and feeders, and 11.1 per cent for dairy and breeding. A similar distribution of hogs by classes indicated 45.5 per cent for slaughter, 53.7 per cent for feeding, and .8 per cent for breeding. Sheep were sold largely for slaughter, 70.4 per cent. Only 2.9 per cent were sold for feeding, and 26.7 per cent for breeding.

Age Group Characteristics

West Virginia farmers sold 41.6 per cent of the cattle at less than six months of age. Average weight of this age group was 199 pounds; 85.9 per cent were for slaughter, 65.4 per cent were either of a dairy herd or of mixed breeding (beef and dairy). Only 12.6 per cent of the cattle were reported sold between the ages of six months to one year. Average weight of this age group was 480 pounds; 68.9 per cent were for feeding, and 88 per cent were of a beef breed.

The average weight of the 15.9 per cent reported sold between the ages of one to two years was 725 pounds. Of these, 52.4 per cent were for feeding and 86.2 per cent were of a beef breed. Of the 29.9 per cent reported sold after the age of two years, 76.7 per cent were for slaughter, 60.4 per cent were of a beef breed. The average weight was 961 pounds.

Fifty-two and six tenths per cent of the swine were sold at less than three months of age at an average weight of 36.4 pounds; 14.6 per cent between the ages of three to five months at an average weight of 139.6 pounds; 31.3 per cent between the ages of five months and one year at an average weight of 181 pounds; and 1.5 per cent over one year of age at an average weight of 347.2 pounds. Ninety-four per cent of the sheep were reported sold before reaching six months of age. Average weight was 76 pounds.

Lot Sizes

West Virginia farmers reporting sales of livestock by species indicated that of the farms selling a designated species, an average of 8.2 head of cattle were sold per farm, 2.1 head of calves per farm, 10 head of hogs per farm, and 26.4 head of sheep.

Of the cattle and calves, 4.6 per cent were sold in lots of one per farm, 7.2 per cent in lots of two per farm, 15.9 per cent in lots of three to five per farm, 18.7 per cent in lots of six to ten per farm, and 53.6 per cent in lots of over ten per farm.

Only 1.8 per cent of the hogs were sold in lots of one per farm, 1.9 in lots of two per farm, 7 per cent in lots of three to five per farm, 17.8 in lots of six to ten per farm, and 71.5 per cent in lots of over ten per farm.

Of the sheep, 1.5 per cent were sold in lots of one to five per farm, 7.4 per cent in lots of six to ten per farm, 10.4 per cent in lots of 11 to 15 per farm, 11 per cent in lots of 16 to 20 per farm, and 69.7 per cent in lots of over 20 per farm.

Seasonality of Sales

Most of the slaughter cattle and calves (79.3 per cent) moved to market from June through October, with the movement of younger animals being greater in June, July, and August, and the older animals in September and October.

In September and October 58.7 per cent of the feeder cattle were sold. Hog sales were greatest in May, June, August, and November, with percentages running 10.6, 15.7, 13.3, and 10.6, respectively. Sales of slaughter lambs range from 34 per cent in July to 20.4 per cent in August, 18.2 per cent in October, and 17.1 per cent in September.

Marketing Agencies

A high percentage of the animals sold for breeding purposes went direct to other farmers—55.4 per cent of the breeder cattle, 62.5 of the breeder hogs, and 48.3 per cent of the breeder sheep. Slightly more than one-half of the feeder hogs were reported as being sold direct to other farmers, and slightly over one-fourth of the feeder cattle and calves. Approximately three-fourths of the feeder sheep were sold through the auctions and the remainder through livestock cooperatives.

Table 1 indicates the prevalence of sales reported through the auctions. Accessibility of the auctions seems to be one of their strong points. It was necessary to transport approximately 80 per cent of the cattle and calves sold through the auction less than 30 miles, with the percentages for hogs and sheep being even higher, 86 and 92, respectively.

TABLE 1. LIVESTOCK SOLD BY W.VA. FARMERS THROUGH SPECIFIED MARKET OUTLETS, BY SPECIES, 1950

MARKETING AGENCY	CATTLE AND CALVES	HOGS	SHEEP
	per cent	per cent	per cent
Terminal Market ..	2.3	1.4	2.3
Auction Agency	63.8	51.3	66.9
Traders	15.8	16.8	3.2
Packing Plant	1.6	.2	.....
Feeder Calf Sales ..	.9	.....	.....
Co-op Assn.	1.4	.9	14.7
Other Farmers	14.2	29.3	12.9

W. S. HUTSON is an assistant in Agricultural Economics.

Sales—Purchases

Since farmers raise most of their livestock, the volume of sales exceeds the volume of purchases by farmers. In 1950 the number of cattle and calves bought was only 34 per cent of the number sold, with 88.7 per cent of those bought being for breeding and feeding. The number of hogs bought was 56.2 per cent of the number sold, with 90.6 per cent of those purchased being for feeding. The number of sheep bought was one-third of the number sold, with 92.6 per cent of those purchased being for breeding purposes.

TABLE 2. Livestock Bought by W.Va. Farmers Through Specified Marketing Agencies, by Species, 1950

Marketing Agency	Cattle and Calves	Hogs	Sheep
	per cent	per cent	per cent
Terminal Market ..	.3	.....	.....
Auction Agency	52.5	50.6	7.7
Traders	6.2	3.4	34.5
Feeder Calf Sales ..	.7	.....	.....
Co-op Assn.	3.1	.....	7.8
Other Farmers	37.2	46.0	50.0

EGGS

(Continued From Page 5)

the kind of eggs they stated they would prefer.

When it was evident that the stated preference differed from eggs bought, the homemaker was asked why. In some instances she stated that price kept her from buying her preference. In most cases, however, she said that the kind of eggs she wanted were not available in stores where she might shop.

It could not be determined how important eggs are in the homemaker's decision of which food store to patronize, but if two stores were alike in other respects, it is possible that the availability of her egg preference would be the deciding factor. Since egg preferences vary considerably among individual homemakers, it is believed that the retailer with several choices will satisfy and thus gain more shoppers.

"Long" Carton Preferred

When shown different types of cartons from which to choose, homemakers expressed a strong preference for the "long" two-row carton, with six eggs per row. This agreed with market experiments in which the long carton outsold the "square" carton (three rows with four eggs per row) by about six to one.

New Publications

(Continued From Page 2)

Mimeographed Circulars

66. J. L. Cartledge, R. J. Friant, and C. W. Neal. Results of Hybrid Corn Yield Trials in West Virginia, 1950. February 1951.

67. E. H. Tryon. European Pine Shoot Moth Attacks Red Pine Plantations. April 1951.

68. A. D. Longhouse, J. G. Leach, and Collins Veatch. A Hot-Water Treater and a Seed Drier for Use in the Control of Loose Smut in Wheat and Barley. December 1951.

Scientific Papers

423. Mary Ann Cipolloni, Burch H. Schneider, Henry L. Lucas and Helen Pavlech. Significance of the Differences in Digestibility of Feeds by Cattle and Sheep. *Jour. of An. Sci.* 10, no. 2: 337-343. May 1951.

424. Gerald S. Richards. Factors Influencing Sporulation by *Septoria Nodorum*. *Phytopath.* 41: 571-578. July 1951.

425. K. A. Tabler, W. J. Tyler, and George Hyatt, Jr. Type, Body Size, and Breeding Efficiency of Ayrshire Cow Families. *Jour. of Dairy Sci.* 34, no. 2: 95-105. February 1951.

430. I. D. Porterfield, George Hyatt, Jr., D. P. Brown, and A. D. Longhouse. A Comparison of Comfort and Tie Chain Stalls. *Jour. of Dairy Sci.* 34, no. 2: 149-153. February 1951.

432. Norman O. Olson. A Respiratory Disease (Bronchitis) of Quail Caused by a Virus. *Proc. of U. S. Livestock Sanitary Assoc.* 54th Annual Meeting. November 1950.

433. Norman O. Olson. The Use of Streptomycin and Dihydrostreptomycin as a Treatment for Infectious Sinusitis in Turkeys. *Jour. of Am. Vet. Med. Assoc.* 118, no. 888: 174-175. March 1951.

442. H. L. Barnett and V. G. Lilly. The Inhibitory Effects of Sorbose on Fungi. *Science*. 114. no. 2965: 439-440. October 1951.

Science Serves Your Farm

This is the first issue of *Science Serves Your Farm*, quarterly report of the West Virginia University Agricultural Experiment Station. Issues of this publication will be released in December, March, June, and September.

Science Serves Your Farm will contain stories and reports giving the latest research results at the Station. You can get a free copy by contacting your county agricultural agent or by writing to the Station in Morgantown.

Field Days

STATION research workers like to think of field days as visual progress reports. The many field days held each year provide an excellent opportunity for farmers to see practical demonstration of research at work.

In 1951, six field days were held on various University experimental farms in the State. More than 3,000 people attended these events. Above is a typical field day scene.

The fourth annual Dairy Day, held in June, attracted 1,200 people. The latest in dairy research will again be on display in June, 1952.

Here are the attendance figures for other field days held in 1951:

Agronomy Field Day, Point Pleasant, 500.

Combined Animal Husbandry-Poultry Husbandry Field Day, Wardensville, 1,000.

Strawberry Day, Marcus Rennix Farm, Randolph County, 40

Horticulture Field Day, Kearneysville, 70.

Grassland Field Day, Morgantown, 200.

In addition to giving viewers a preview of research results, field days give the researcher and the farmer a chance to become better acquainted. Opportunities are provided to gain understanding of each other's problems.

Besides Dairy Day, several other field days are being planned for 1952. Be sure to attend whenever you can.

These station projects were active in the year 1950-51:

(Abbreviations for funds supporting projects: A—Adams; BJ—Bankhead-Jones; NE—Northeastern Region, Research and Marketing; NEM—Northeastern Region (marketing), Research and Marketing; RM—Research and Marketing; P—Purnell; SCS—Soil Conservation Service; S—State; USDA—United States Department of Agriculture.

Administration

Planning Cooperative Research under Title 1 of the Research and Marketing Act (RM 11)

Agricultural Biochemistry

Isolation, purification and determination of some of the hemicellulose constituents found in the nitrogen-free extract of feeds and foods (A 12)
Ascorbic acid metabolism (PUBLICATION ONLY) (BJ 48; coop. Home Economics)
Factors needed to supplement rations for satisfactory growth, reproduction and lactation (BJ 51)
Miscellaneous chemical investigations (S 5)
Glycine content of poultry feeds (S 68)
Broiler rations for high efficiency (P 57; coop. Animal Husbandry)
Human nutritional status studies in W. Va. (RM 7, NE 4; Coop. Home Economics)

Agricultural Economics

Harvesting hay in W. Va. (BJ 50; coop. Agricultural Engineering, Agronomy)
Custom rates for farm jobs (BJ 60)
Effect of consumer choice on egg marketing (S 62; coop. USDA)
Wholesale produce marketing facilities in Huntington, W. Va. (S 64; coop. USDA)
A survey of a stranded town: Elk Garden, W. Va. (S 67)
Seasonal milk production on W. Va. farms (P 48; coop. Dairy Husbandry)
Some factors affecting the vitality of 4-H club work in W. Va. (P 52; coop. Extension Division)
Marketing W. Va. apples and peaches (RM 1, NEM 2)
Marketing W. Va. eggs (RM 2, NEM 5)
Marketing economies and consumer benefits from an even milk production in W. Va. (RM 3, NEM 1)
Inter-market price relationships for milk and dairy products in W. Va. (RM 17, NEM 1)
Techniques for measuring consumers' choice (RM 25; coop. Bureau of Agricultural Economics)
Marketing livestock in W. Va. (RM 28)
An appraisal of the economic efficiency of marketing Shenandoah Valley apples in fresh fruit markets (RM 29)

Agricultural Engineering

Design and construction of a pasteurizer of commercial capacity for nut meats (S 57; coop. Horticulture)
Study of the design and operating characteristics of a grain conveyor using fluidization principles (S 63; coop. Engineering Experiment Station)
Determination of factors influencing the drying rates of grains (P 55; coop. Engineering Experiment Station)
Investigations to determine the optimum stall for dairy cows (RM 5; coop. Dairy Husbandry)
To determine the most efficient and economical methods of removing manure and litter from dairy barns (RM 6; coop. Dairy Husbandry)
Design, construction, and testing long hay blowers (RM 15)
Study of the design and operating characteristics of a barn baled hay drier using supplemental heat (RM 21; coop. W. Va. Board of Control)
A study of some of the factors involved in using supplemental irrigation on W. Va. pastures (RM 24; coop. Dairy Husbandry, Agronomy)

Agronomy and Genetics

Corn genetics and breeding (BJ 3; Reymann Farms, Ohio Valley Farm, University Experiment Farm, N. E. Corn Conference, W. Va. Extension Service)
Reclaiming eroded soils (BJ 17; coop. Forestry, Reymann Farms, SCS, USDA)
The effect of fertilizer treatments and cropping systems on the yield and quality of tobacco (BJ 19; coop. Ohio Valley Farm, USDA)
Breeding and improvement of pasture grasses and legumes (BJ 26; coop. Plant Pathology, USDA, Regional Pastures Laboratory)
Selection and breeding of superior strains of red clover for W. Va. (BJ 43; coop. Plant Pathology, Extension Service, USDA)
Barley breeding and testing (BJ 54)
The interrelation of soil fertility, planting rate and geometry of spacing in relation to yield of various hybrid corn varieties (BJ 58)
Field crop variety testing (S 6)
Soil survey work in W. Va. (S 8)
Alfalfa investigations (PUBLICATION ONLY) (S 10)
Crop rotation experiments (S 11)
Crop responses to various fertilizers (S 14)
Changes in condition following a mine sealing, tile draining and surface treatment in soil acidized by run-off of mine water (PUBLICATION ONLY) (S 40)
Road-bank stabilization (PUBLICATION ONLY) (S 50)
Killifer furrows in eroded black shale for run-off (S 58; coop. Reymann Farms)
Characteristics of flow from a large spring (S 59; coop. Reymann Farms)
The establishment and testing of grass and legume species and strains for soil conservation (S 87; coop. Nursery Division, SCS)
Studies on W. Va. pastures (PUBLICATION ONLY) (P 30-1; coop. USDA)
Plant nutrient availability studies—foliar nitrogen, phosphorus and potassium interactions as influenced by fertilization and soil nutrient supplies (P 45)
The phosphorus and potassium supplying and fixing power of several important W. Va. soils (P 58)
The influence of fertility and management on several Ladino clover-grass mixtures (P 59)
Maintaining profitable stands of alfalfa (RM 10; coop. Plant Pathology)
Weed control in corn (RM 22; coop. Reymann Farms)
Forage crops varieties, strains, and species for W. Va. (RM 26, NE 10)

Animal Husbandry

Effect of selection in cross breeding on broilers within certain heavy breeds of chickens (A 7; coop. Reymann Farms)
Improving marketing value of turkeys by cross breeding (PUBLICATION ONLY) (BJ 5)
Selection of breeders in relation to longevity of progeny in S. C. White Leghorns (PUBLICATION ONLY) (BJ 13)
Breeding efficiency of dairy cows (BJ 42; coop. Dairy Husbandry)
The effects of thyroid stimulants and depressants on growth and fattening of swine (PUBLICATION ONLY) (BJ 47)
Effect of heredity and environment on keel deformities in White Leghorns (BJ 53)
Effect of prophylactics and therapeutics for controlling coccidia in chickens (BJ 55; coop. Reymann Farms)
Legume grass silage vs. corn silage for wintering beef cows (S 53; coop. Agricultural Biochemistry, Reymann Farms)
Coccidiosis and Newcastle disease (S 88)
Exploratory or preliminary investigations on diseases, feeding, and management of farm animals (S 89)
A study of the relative values for growth of the proteins of a number of feeds used in poultry rations (P 4; coop. Agricultural Biochemistry)
Silages for cattle and sheep (PUBLICATION ONLY) (P 34; coop. Agricultural Biochemistry)
Methods of feeding growing pullets (P 39; coop. Reymann Farms)
Comparison of native and western ewes for production and longevity (P 41; coop. Reymann Farms)
The relation of birth weight within breeds to growth rate of purebred mutton type lambs (P 50)
Some chemical and physical analyses of the blood of dairy cows (RM 8, NE 1; coop. Dairy Husbandry)
Improving the reproduction performance of turkeys (RM 9)
Transmission and immunity of vaccine strains of Newcastle disease in chicks following adult vaccination (RM 23, NE 5)
Causes of sterility in cattle (RM 30, NE 1; coop. Dairy Husbandry, W. Va. Artificial Breeders' Coop.)

Dairy Husbandry

The feeding of thyroprotein to dairy cattle (BJ 38; coop. Agricultural Biochemistry, Animal Husbandry)
The use of type and production records as a basis for a dairy cattle improvement program (BJ 45; coop. Agricultural Economics, Ayrshire Breeders Assoc.)
Preliminary or exploratory investigations on diseases, feeding, and management of dairy cattle (S 86)
Miscellaneous investigations of dairy products (S 90)
The transmission of milk and butterfat production and body conformation by dairy sires (P 14; coop. USDA)
The keeping quality of milk in home refrigerators (P 49)
Prepartum milking of dairy heifers (P 51; coop. Agricultural Biochemistry)
Some chemical and physical analyses of the blood of dairy cows (RM 8, NE 1; coop. Animal Husbandry)

(Continued on Page 14)

Blueberry Breeding

THE STATION is now testing fifteen United States Department of Agriculture blueberry selections.

W. H. Childs, associate horticulturist, reports that this year the fruit from seven selections from the West Virginia breeding project were compared with twelve of these USDA selections as regards appearance (eye appeal), flavor (taste appeal), and size (cup count).

Eight faculty members of the College of Agriculture, Forestry, and Home Economics rated samples of the nineteen selections according to how the taste and appearance appealed to them. Since none of the testers had any experience with blueberries, it was felt that they would be fairly representative of the reactions of the general public.

The West Virginia selections were samples of those retained for second trial only. Since they would be subject to considerably more culling in the future, it was not expected that they would rate very high in comparison with the USDA selections, which had been culled more closely. However, a few of them did fairly well. One selection rated second in appearance and another second in flavor.

Berry size is measured according to the number of berries it takes to fill a measuring cup. The lowest cup-count recorded was 62 for one of the USDA selections, whereas two of the West Virginia berries had cup counts of 64 and 66.

Dr. Childs states that such comparisons indicate only that we are getting satisfactory size, flavor, and appearance in some of our crosses. When we find a cross in which all three are satisfactory, and other factors such as scar, bush type, and productivity are good, we shall have a berry worthy of introduction. Among the 275 plants selected for second trial to date from the more than 12,000 hybrids, it is probable that a few will fulfill these requirements.

Blister-Shake of Yellowpoplar

A NEW TYPE of injury was observed recently on yellowpoplar in a thirty-year-old hardwood stand near Morgantown, West Virginia. It was found in the lower portion of the tree and always between the 1935 and 1936 growth rings.

This injury resulted from a separation of the bark and cambium from the wood when the outer layers became warm and expanded and the inner wood remained cool. A late frost, with alternate freezing and thawing following the severe winter of 1935-36, is believed to have brought about such conditions. As a result a large blister was formed. Growth then continued and wood was laid down over the cavity of the blister. This cavity, within the woody portion of the stem, results in a defect similar to a shake and has been named *blister-shake*.

Yellowpoplars examined and having blister-shake ranged from 10.5 to 13 inches in diameter, and in 1936 when the injury occurred, were between five and seven inches in diameter. The extent of the injury around the trees varied from three inches to complete encirclement of the stems. The height was from near ground level to five to eleven feet above the ground, the greatest extent being in trees completely encircled.

The defect resulted in loss of lumber of four to thirty board feet per tree. The loss in the first 16-foot log varied between 10 and 60 per cent of the total board foot volume. Blister-shake has been found in two other areas in northern West Virginia since it was first discovered in Morgantown.

In addition to being a new type of injury, the occurrence of frost damage on the base of trees as large as five to seven inches in diameter is unusual.

Incidentally, foresters, forest owners, and others interested in this injury should keep on the lookout for *Blister-Shake of Yellowpoplar*, a new West Virginia University Agricultural Experiment Station bulletin that is now in the press for publication. Authors are Earl H. Tryon and R. P. True.

Granular Vaginitis

GRANULAR VAGINITIS of dairy cattle is undoubtedly the most widespread disease of dairy cattle in the world. Leo Kotchek, assistant animal pathologist, is working on this problem at the Station. The disease is characterized by the presence of granules or small pimples in parts of the female reproductive tract.

Kotchek suspects that granular vaginitis may at times cause a markedly lowered rate of conception of cattle with the disease. A type of breeding trouble of dairy cattle is present in some herds in West Virginia whereby a majority of the females bred do not conceive after four to seven services. In these herds granular vaginitis is usually present to a certain degree. This situation is of concern to dairymen because it affects herd replacement and milk production schedules. And, the cause of granular vaginitis and the importance of the granules in the reproductive tract is not very well known. The disease seems to be highly contagious.

Kotchek examines 90 University cows and several privately-owned cows each week, and the extent of infection is observed. To date certain experimental drugs that the Station has used fail to control the infection. His work will continue, however, with use of drug treatments, observations, and examination of affected cows before and after slaughter.

OAK WILT

(Continued From Page 4)

(4) More than half of the fifty trees found in the survey appeared to represent new infections — indicating that active spread of the disease is occurring within the State.

From this it may be safe to conclude that this serious disease is established and spreading at several localities within the State. As yet it has done no major damage.

On the basis of these facts a research program on the disease, its method of spread, and its possible control within the State has seemed justified and has been undertaken.

Staff of Station

November 1, 1951

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J. F. Fulkerson, M.S., Plant Path.
M. E. Gallegly Jr., Ph.D., Asst. Plant Path.
V. G. Lilly, Ph.D., Physiol.
C. R. Orton, Ph.D., Plant Path. (On leave until April 1, 1952)
Mary Alice Ryan Sands, M.S., Asst. in Bact.
R. P. True, Ph.D., Assoc. Plant Path.
H. A. Wilson, Ph.D., Assoc. Bact.

MISCELLANEOUS
D. R. Creel, Photog.
John Luchok, B.S.J., Acting Editor
Stanley J. Nels, B.S.J., Asst. Editor
J. F. Silbaugh, B.S.J., Editor (On military leave)
Martha R. Traxler, Chief Clerk

Projects of Year

(Continued from Page 12)

Entomology

Miscellaneous insect and insecticide studies (S 24)
The toxicity of cumulative spray residues in soil (RM 18; coop. University Experiment Farm, Plant Pathology, Agronomy, Bureau of Entomology)

Forestry

Mobile circular sawmill for farm woodlots in W. Va. (BJ 44)
Efficient forest management practices for W. Va. cut-over and burned-over hardwood forest lands (BJ 49; coop. Conserv. Comm.)
Animal repellents on hardwood forest plantations (BJ 56)
Influence of various degrees of thinning on the growth rate of residual yellowpoplar trees (BJ 57)
Growth of vegetation and rate of soil development on old iron-ore spoil banks (BJ 59)
Improvement of farm game and wild life conditions of the soil conservation district (S 42)
Plantings of forest trees and shrubs at Greenland Gap (S 56)
Determination of optimum growth of W. Va. hardwoods (S 60)
Test specimens for wood adhesives (RM 16)
Management of forest land for sustained-yield, mine timber production (RM 19; coop. Forest Products Association)
Timber management for the market demands in southern W. Va. forests (RM 31)

Home Economics

Space, facilities, and structural requirements for activities relating to the business of the farm and home in W. Va. (RM 27, NE 7; coop. Agricultural Engineering, Extension Service)

Horticulture

Improvement of potato varieties for W. Va. (A 11; coop. Plant Pathology)
Selection, breeding, and propagation of the lowbush blueberry vaccinium vaccillans (BJ 12)
Effect of certain chemicals on color, finish, and maturation of apples (BJ 61)
Miscellaneous horticultural investigations (S 27)
Variety tests of tree and small fruits (S 29)
Variety and strain studies of vegetables (S 31)
Production, development, and marketing of hillculture products in W. Va. (S 49)
Lily bulb production trials (S 61; coop. USDA)
Nutrition of apple trees in W. Va. (S 65, also P 56; coop. University Experiment Farm, Entomology, Plant Pathology)
Effect of new growth substances on the preharvest drop of apples (S 66; coop. University Experiment Farm, Entomology, Plant Pathology)
Chemical thinning of apples and peaches (S 69; coop. University Experiment Farm)
Apple and peach insect control (S 91; coop. University Experiment Farm, USDA, Bureau of Entomology and Plant Quarantine)

Plant Pathology

Effect of environment upon growth, reproduction, and parasitism in fungi and bacteria (A 6)
Anatomical and histological changes in diseased plants (A 10)
Nutrition of fungi and bacteria with especial reference to substances which induce, stimulate, or inhibit growth and reproduction (BJ 2)
Spray injury and fungicidal efficiency of orchard sprays as influenced by the weather (BJ 6)
Testing new fungicides with particular reference to their application to potatoes and vegetable crops (BJ 32)
Forest tree diseases, Sub-2, chestnut blight (S 18; coop. Forestry, Horticulture)
Miscellaneous plant disease investigation (S 19)
Apple measles (P 19)
Black rootrot of apple (P 21)
Control of loose smuts of wheat and barley through centralized hot-water seed treatment (PUBLICATION ONLY) (P 40; coop. Agricultural Engineering, Agronomy)
Microbiology of strip mine seepage water in relation to plant growth and soil conditions (P 53; coop. Agronomy)
Decay as a factor in sprout reproduction of yellowpoplar (P 54; coop. Forestry)
Storage and market diseases of tree fruits (RM 13; coop. Agricultural Economics)
Cause of and remedy for red clover failures in W. Va. (RM 14; coop. Agronomy)

Financial Statement for the year July 1, 1950, to June 30, 1951

Classification of Receipts and Disbursements	Hatch	Adams	Purnell	Bankhead-Jones	Research & Marketing 9b1-2	Research & Marketing 9b3	Research & Marketing Title II	Regional Funds	Total
RECEIPTS									
Received from the Treasurer of the U. S.	$15,000.00	$15,000.00	$60,000.00	$65,169.05	$71,672.80	$31,[illegible]5.00	$2,500.00	....	$261,256.85
State appropriations Main station	....	....	....	....	....	....	....	$130,580.00	130,580.00
Substations	....	....	....	....	....	....	....	62,750.00	62,750.00
Special	....	....	....	....	....	....	....	110,866.00	110,866.00
Special grants, etc.	....	....	....	....	....	....	....	8,390.40	8,390.40
Sales	....	....	....	....	....	....	....	142,627.57	142,627.57
Balances forward					33,244.60	9,587.09	....	128,423.85	171,255.54
Total Receipts	$15,000.00	$15,000.00	$60,000.00	$65,169.05	$104,917.40	$41,502.09	$2,500.00	$583,637.82	$887,726.36
DISBURSEMENTS									
Personal services	$13,591.33	$13,432.79	$49,819.00	$54,440.80	$59,596.92	$25,704.94	$1,221.41	$165,532.21	$383,339.40
Travel	15.35	11.26	309.46	1,822.69	3,761.60	2,511.18	1,006.54	5,487.03	14,925.11
Transportation of things	....	....	....	2.08	16.09	8.00	....	883.39	909.56
Communication service	....	....	....	....	24.68	....	....	2,016.49	2,041.17
Rents and utility services	652.31	....	362.40	337.31	565.61	483.20	....	9,607.30	12,008.13
Printing and binding	....	....	11.50	1,648.24	....	122.82	....	2,327.45	4,110.01
Other contractual services	....	11.19	16.46	87.85	492.52	192.65	....	33,556.84	34,357.51
Supplies and materials	404.61	1,347.95	4,788.61	4,433.61	6,786.61	1,823.01	....	89,128.17	108,712.57
Equipment	336.40	196.81	4,692.57	2,396.47	6,274.17	1,936.76	....	34,325.93	53,159.11
Lands and structures (contr.)	....	....	....	....	....	....	....	130,394.21	130,394.21
Total Disbursements	$15,000.00	$15,000.00	$60,000.00	$65,169.05	$77,518.20	$35,782.56	$2,227.95	$473,259.02	$743,956.78
Unexpended Balances					27,399.20	5,719.53	272.05	110,378.80	143,769.58

STATION PROJECTS APPROVED SINCE JULY 1, 1951

Agricultural Economics

Lowering milk marketing costs in W. Va. (RM 32, NEM 1)

Agricultural Engineering

Preliminary and exploratory investigations pertaining to agricultural engineering (S 97)

Agronomy

Preliminary investigations in soil science (S 94)

Lime requirements of a number of W. Va. soil types (P 60)

Animal Husbandry

Floor space requirements of broilers in a centrally heated house (S 93; coop. Reymann Memorial Farms)

Fat calf vs. feeder calf production in W. Va. (S 95; coop. Reymann Farms)

Nutritional requirements of swine for growth (P 62)

Horticulture

Improvement and selection of ornamental plants (S 92)

On-the-farm production of ornamentals indigenous to W. Va. (S 96)

Improvement of apple juice (P 61; coop. Agricultural Biochemistry)

Selection of nursery crops and propagation methods (RM 35)

Plant Pathology

Oak wilt (RM 33; coop. SCS)

Improvement of tomato varieties for W. Va. (RM 34; coop. Horticulture)

Milk's Keeping Quality

A RECENT STUDY conducted by the Station shows that the keeping quality of pasteurized-homogenized milk is slightly superior to that of pasteurized milk, as shown by flavor scores after three to six days in home refrigerators.

The bacteria count of the two milks, as determined by the plate method, showed that pasteurized-homogenized milk had a slightly greater increase than did pasteurized milk. There was no appreciable difference in increase in acidity of the two milks.

This research was conducted by S. J. Weese, associate dairy husbandman. Look for a feature article on this study in the Spring issue of *Science Serves Your Farm.*

LIQUID MANURE

(Continued from Page 7)

Is It Economical?

As yet the Station has not been able to determine whether or not it is economical to conserve liquid manure. In other words, can a farmer buy commercial fertilizers cheaper than he can collect and distribute liquid manure?

It is hoped that detailed information concerning savings on this project can be given to farmers sometime this year.

Experiment Station workers believe that conservation of liquid manure on West Virginia dairy farms will go a long way toward solving the nitrogen deficiency problem existing on permanent pastures and grasslands.

FARM HOME BUSINESS CENTERS

IT'S EASY to build a two-orange-crate business center for the home. Very few tool and supplies are necessary. Assembled desk at left cost $3.29. The plywood cost $3.04, blocks 25 cents

YOU CAN SET UP an efficient farm home business center for as little as $3.29!

Station experimenters have been working on the problem of finding a suitable means for carrying on farm business with but a slight cost to you.

As you see in one of the pictures on this page, you need only two orange crates, plywood or other material for the desk top, and small blocks of wood. Since the crates are only 26 inches high, the blocks of wood are attached to the bottom to raise the desk top to 29 to 33 inches. Then, apply a coat of stain. You can varnish the completed desk to add luster to your business center. Varnishing saves time in dusting and cleaning, too.

Plywood for the Station's desk was $3.04 and the cost of blocks 25 cents.

The West Virginia Station began research on farm home business needs as part of a general housing project carried on by twelve other Northeastern states. The research is being carried on by the Division of Home Economics and the Department of Agricultural Engineering.

Various ideas and ways for improving your business work and record keeping are explained in a Station circular. You can get a copy of *Farm Home Business Centers,* (Circular 83, August 1951), by seeing your home demonstration agent, or by writing to the Director, West Virginia University Agricultural Experiment Station, Morgantown.

One State farm woman converted an old kitchen cabinet into a good-looking, efficient business center. She removed the cabinet's top and reconditioned it for shelf space. The lower part of the cabinet was converted into a desk. Now it looks almost like a new business unit, and the cost was surprisingly small!

In case you are wondering where to set up a business center in your home, the Station's workers learned in the State survey that the living room is the preferred spot, the dining room was preferred secondly.

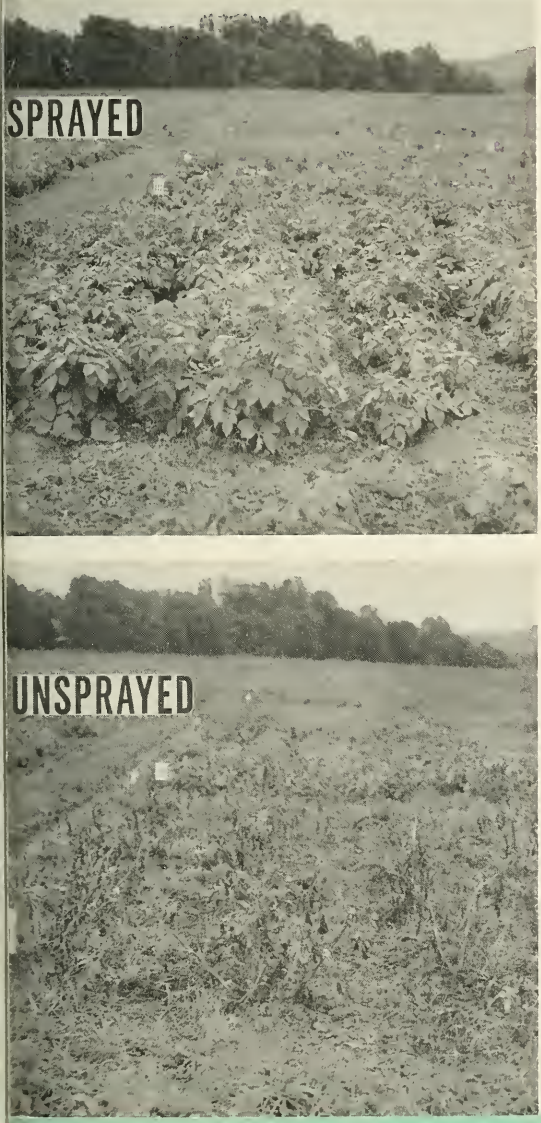
Other things are important, too. You'll need a good filing system, good lighting, and accessories for carrying on your farm's business. All of these items are covered well (and illustrated) in Circular 83. Get a copy soon — then build your own center with ease and at little cost.

Of course, many of you may prefer to buy equipment for your business center. Circular 83 also will be useful to you, as it pictures many types of office equipment.

OLD KITCHEN CABINET (left) was converted into an efficient, modern farm home business center (right) at very low cost.

Science Serves Your Farm

Bulletin 349, Part 2 (Spring Issue) March 1952



Potato Blights

by M. E. Gallegly

EARLY BLIGHT and late blight are the two most important diseases of the potato in West Virginia. Fortunately, they may be controlled by proper spraying or dusting with a suitable fungicide.

(Pictures—Plot 4 [top picture] was sprayed seven times with zineb. Plot 19 [bottom] received no fungicide.)

Early blight is caused by a fungus that bears the technical name, *Alternaria solani*. This disease is most destructive during warm rainy weather. The fungus lives from year to year in the soil and in old potato and tomato plant refuse.

Although potato plants may become infected early, they usually do not show symptoms of the disease until they approach maturity. The disease is first seen as small brown spots on older potato leaves. As the spots enlarge they form concentric rings or miniature "target-boards." Similar spots also occur on potato stems. As the fungus grows in these brown spots it produces a toxin (alternaric acid) that causes a yellowing and premature defoliation. This early leaf drop reduces the amount of food materials available for tuber growth and as a result yields are reduced. Although the early blight fungus may cause a tuber rot, it usually is not serious.

Late blight is caused by a fungus, *Phytophthora infestans*, that overwinters in potato cull piles or in the south on winter potato and tomato crops. The same fungus also causes late blight of tomato and may be transported northward on southern grown tomato plants. Also the fungus spores are airborne and may be carried northward by air currents. Late blight is most destructive when weather conditions are cool and wet. Symptoms of the disease often first appear on the lower leaves as dark brown to black spots that have a pale green border. Under moist conditions the spots have a white mold or mildew on the lower surface of the leaf. This whitish growth produces spores that are spread to other plants and to other parts of the same plants. Under cool, moist conditions the disease spread rapidly and may completely kill the plants within ten days. A field severely diseased with late blight gives the general appearance of having been killed by frost.

(Continued on Page 8)

AGRICULTURAL EXPERIMENT STATION WEST VIRGINIA UNIVERSITY

Science Serves Your Farm

Bulletin 349, Part 2 | Spring | March 1952

Annual Report of H. R. Varney, Director
West Virginia University Agricultural Experiment Station
For the Period 1950-1951

IN THIS ISSUE

April—

5, First Annual Dairy Cattle Congress, Dairy Farm, Morgantown
8, 9, 10, West Virginia Farm Electrification Conference—Jackson's Mill
10, State Section, American Society of Agricultural Engineers — Jackson's Mill
15-17, State Livestock Roundup — Jackson's Mill
27-May 3, National Home Demonstration Week

May—

3, Second Annual Little Eastern National Livestock Show, Morgantown
18, National 4-H Club Sunday

June—

Wardensville Agronomy Field Day
25, Fifth Annual Dairy Day, Dairy Farm, Morgantown

July—

16, Agronomy Field Day, Pt. Pleasant

September—

8-13, B & O Soil Conservation Contest
Twenty-ninth Annual Junior Farmers' Week and Vo-ag Judging Contests, Morgantown

Note: Some exact dates are unavailable. These will be announced in press and radio releases.

Dr. Cartledge

The Station lost one of its most able researchers in the death of Dr. J. Lincoln Cartledge on the night of Jan. 25, 1952.

Dr. Cartledge was attending a meeting of the Northeast Corn Breeders Association in New York City. He died as a result of a heart attack in his sleep at the Barbazon Plaza Hotel.

Married and the father of two daughters and one son, Dr. Cartledge was born Aug. 29, 1895 in Philadelphia. He received his A.B. in 1918 and his M.A. degree in 1921 from the University of Pennsylvania. He received his doctorate from the University of Pittsburgh in 1928.

An author of several magazine articles, Dr. Cartledge also was the leader of the annual hybrid corn trials conducted by the Station. His latest work on hybrid corn is published in the Station's Current Report 1, *Results of Hybrid Corn Yield Trials in West Virginia*, 1951.

At the University, Dr. Cartledge was assistant professor of genetics from 1936 until 1949 when he became professor of genetics. He served as assistant geneticist in the Station from 1938 and was made geneticist in 1949.

Gully Control

Water control on West Virginia farms is always a problem. This is especially true for dairy farms where large numbers of cattle are generally found in small areas, and where road waters and water collected from buildings is handled.

The University's Dairy Farm near Morgantown in 1949 had a very bad gully in an open pasture and the situation was worsening. The gully carries water from the dairy buildings and the paved barn lots. It is about 300 feet long and is located on a slope averaging more than 35 per cent.

Large tile could have solved the problem, but the cost was too great. The tile that was previously laid was washed out. After the situation was studied by a committee, it was decided to plant the gully to plants. The committee made two recommendations: (1) protect the gully area from grazing, and (2) plant it to shrubs and vines.

The gully was planted to Multiflora Rose in 1949. Soil Conservation Districts furnished 350 rose plants. They were planted on each side of the gully, with a spacing variation of 18 to 36 inches. Another planting in 1950 was of Reed Canary grass sod dams in the bottom of the gully. The sods were about 12 by 36 inches.

The rose plants grew more than three feet during the first year. They were protected from grazing by use of an electric fence. By the second year the roses had formed a cattle-proof fence. The gully sides seem to be well established except one section where more work is needed to stabilize the gully's bottom. Shade from the Multiflora Rose hindered growth of the Reed Canary grass sod.—H. O. Henderson, dairy husbandman.

New Publications

Bulletins

349, Part 1. Annual Report of H. R. Varney, Director. Science Serves Your Farm. December 1951.

350T. E. H. Tryon and R. P. True. Blister-Shake of Yellowpoplar. January 1952.

Current Reports

1. J. L. Cartledge, R. J. Friant, and C. W. Neal. Results of Hybrid Corn Yield Trials in West Virginia, 1951. February 1952.

Annual Report, Parts Published Quarterly by
AGRICULTURAL EXPERIMENT STATION
West Virginia University
Morgantown, W. Va.
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Editor ..... John Luchok
Asst. Editor ..... Stanley J. Nels
Photographer ..... David R. Creel
Drawings ..... Enid L. Asher
Doris Walker

Publications Committee: Oscar E. Schubert, H. L. Barnett, and G. C. Anderson.

Science Serves Your Farm will be sent free to any resident of West Virginia in response to a written request to the Director, Agricultural Experiment Station, West Virginia University, Morgantown, W. Va.

MONTANA CERTIFIED (left) and Oregon Certified (right) Ladino clover associated with Lincoln smooth bromegrass. Montana Certified is not so well adapted here nor is it so able to compete with bromegrass as is Oregon Certified.

FORAGE CROPS

Station Trials

by O. J. Burger

IMPROVED FORAGE CROPS and improved management and utilization methods are the main items in a research project being conducted by Station agronomists.

This work is being carried out parallel to research of eleven other Northeastern states to gain more knowledge of forages. Work began here in the summer of 1949 and will continue for several years.

In April, 1950, 480 plots were seeded to various legumes and grasses. Legumes under study include birdsfoot trefoil; six varieties of alfalfa, and five varieties of red clover. Grasses being tested include seven varieties and strains of orchardgrass; six varieties of bromegrass, and five varieties of timothy. The species were seeded alone and also were combined into mixtures.

Notable findings to date are as follows:

Naragansett and Williamsburg alfalfa produced the highest yields, with over three and one-half tons of dry matter per acre. Alfalfa yields were highest when grown with smooth bromegrass. Of the legumes, Oregon Certified and Idaho-Aberdeen Ladino clover gave highest yields, but the Ladino-orchardgrass mixture produced best, with over three tons of dry matter from four clippings.

Viking birdsfoot trefoil consistently outproduced the two other birdsfoot trefoil varieties, Empire and Italian. Highest yields were received when birdsfoot trefoil was planted with timothy. Dollard and Scott red clover were tops in yield, and the red clover-timothy mixture produced the highest total for the season. Lincoln smooth bromegrass gave highest season total yields. It was followed closely by Fischer and Achenbach. In the orchardgrass and timothy trials, commercial orchardgrass and commercial timothy were the best yielders.

Three management practices were imposed on the experimental plots: (1) clipping to simulate rotational grazing or silage; (2) first crop for hay or silage followed by clipping to simulate aftermath grazing; and (3) hay or silage (alfalfa, red clover, timothy). The first two practices were performed on Ladino, birdsfoot, orchardgrass, and bromegrass plots.

If a legume is to be adapted to West Virginia, it must stay in a mixture for a few years. For example, pictures at top of page show that Oregon Certified Ladino clover is not only better adapted to this region than is Montana Certified, but that it also is better able to compete with bromegrass.

Management practices very often determine the botanical composition of mixtures that include Ladino clover and alfalfa. The tall fescue-Ladino clover hay and pasture plots in pictures at bottom of page show that if you allow tall fescue to go further in its growth toward maturity (as in hay) the Ladino clover in the mixture greatly decreases.

KENTUCKY 31 fescue-Ladino clover managed for hay, 3 cuttings (left) and same combination managed as pasture, 4 cuttings (right). Note the greater population of Ladino clover in the plot managed to simulate pasture. Plots at Morgantown.

O. J. BURGER is Assistant Agronomist and Assistant Professor of Agronomy.

OAK WILT FUNGUS

in the laboratory

by H. L. Barnett, V. G. Lilly, and R. P. True

CHARACTERISTIC asexual spores of Chalara are pushed out from ends (arrow) of branches of fungus mycelium.

IN 1952 you will be hearing more and reading more about the oak wilt problem in West Virginia.

Since last summer when the oak disease was discovered in the State, our plant pathologists and bacteriologists have undertaken a coordinated research program in several phases of the oak wilt problem. One phase is the isolation, identification, and study of the casual fungus (*Chalara quencina*). Because of the Station's trained personnel and the excellent facilities in its mycological laboratories for carrying on research on the processes and activities of the fungi, an early start on the laboratory phase was possible.

Right now the only sure way of determining oak wilt is to isolate and identify the pathogen in the laboratory. This is needed because the symptoms of a diseased oak tree are not always easily seen. The method of taking samples from suspicious-looking oaks was described in detail in the December, 1951, *Science Serves Your Farm*.

In the laboratory the bark is removed from the samples, and chips of wood are cut under septic conditions (pictures 1, 2). These are planted on agar media in Petri dishes (picture 3), which are then placed in a constant temperature room near 75° F. The fungi that grow out from the chips are examined with a microscope (pictures 4, 5, 6). *Chalara* may be easily distinguished from other fungi found in oak wood by its characteristic asexual spores (endoconidia). (See picture above.)

Isolation Methods

Studies on the different methods of isolation at the Station have resulted in development of two different techniques by which the fungus can be induced to sporulate quickly. In this way the time required for the determination of oak wilt has been shortened from about twelve days to as little as three to five days. One of these methods takes advantage of the characteristic ability of *Chalara* to produce spores quickly when chips of diseased oak wood are submerged in a dilute liquid medium in test tubes. Since few other fungi are able to sporulate in submerged culture, this makes positive identification of the oak wilt pathogen much easier.

The second method involves the use of a special agar medium that favors early sporulation of the oak wilt fungus. This method differs from others that are commonly employed principally in the use of phenylalanine, an amino acid, as the only source of nitrogen.

Growth Studied

The cultivation of the fungus in the laboratory makes it possible to study it under controlled conditions and to determine the nutritional and environmental factors that affect growth and the production of spores. Some of these factors have already been studied at the Station. The optimum temperature for growth is near 77° F. The growth and production of spores stops when the temperature reaches about 88° F. The fungus grows slowly when the temperature is as low as 40 to 50° F., but it is not killed by freezing. In fact, it may live indefinitely at low temperature. We might expect that the pathogen would become most active in nature during the early summer months.

Studies of the vitamin needs of *Chalara* have shown that it is partially deficient for biotin and thiamine (Vitamin B_1). This means that both of these vitamins must be furnished for the best growth.

Nutritional Findings

One of the fundamental nutritional studies has concerned the ability of the fungus to utilize different sugars and nitrogen sources. Although able to utilize most of the common sugars, it failed to grow on sorbose. The fungus is not able to utilize nitrate as a source of nitrogen but can utilize nitrogen of ammonium and various organic compounds. The acidity of the medium was found to affect the rate of growth, although growth did take place within the pH range of 3.0 to above 7.0, the optimum being near 6.0. The longevity of the spores and mycelium under various conditions, a problem now being investigated, must be studied both under the more rigidly controlled laboratory conditions and the more variable environment in nature.

Laboratory research is an important phase of the oak wilt investigations. These experiments are planned to give data that will supplement information found in field work. We must understand the fungus that causes oak wilt (and its activities) in order to understand the disease it produces.

H. L. BARNETT is Mycologist and Professor of Mycology. V. G. LILLY is Station Physiologist and Professor of Physiology. R. P. TRUE is Associate Plant Pathologist and Associate Professor of Plant Pathology.

the fungus--

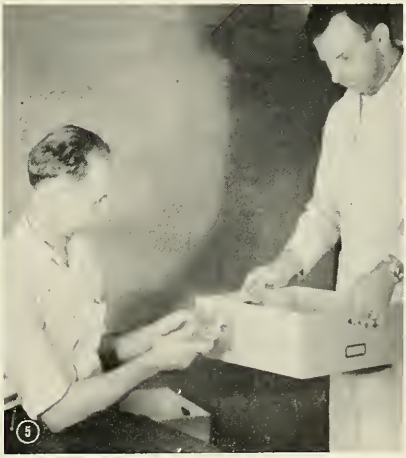
A CLOSE LOOK

BARK is removed from a branch sample.

DIP in alcohol, burning gets rid of contaminants on surface.

SMALL CHIPS cut with sterile knife are placed in agar.

FUNGUS (outer edge) grows out from chips (center, arrow) within few days.



THE CULTURES are examined daily.

THE FUNGUS is examined with a microscope for spores.

MILK'S keeping quality

by S. J. Weese

HOW LONG can processed milk be kept in home refrigerators under normal conditions?

This question has become very important in recent years because world conditions have forced many milk distributors to change from a system of everyday milk delivery to every-other-day delivery. With every-other-day delivery, milk must retain its quality up to four days after pasteurization. For this reason, the West Virginia University Agricultural Experiment Station began a study to determine if good pasteurized-homogenized milk would keep its high quality with every-other-day delivery if it was kept in home refrigerators under ordinary conditions.

The great increase in sales of pasteurized-homogenized milk during the last decade has warranted a study of its keeping quality compared with keeping quality of pasteurized milk. In a previous study the Station found that pasteurized milk of good quality retained good quality four days after delivery.

Eighteen families with electric refrigerators participated in this study. Each family received quart bottles of pasteurized and pasteurized-homogenized milk of the same quality. In all, 322 quarts, equally divided, were distributed in June, July, and August.

This milk was produced at the University Dairy Farm and delivered to the University Creamery each morning. It was then pasteurized at 144° F. for 30 minutes. A portion of each vat was homogenized after pasteurization, using 2,200 pounds of pressure, with a two-stage homogenizer. The quart samples of both pasteurized and pasteurized-homogenized milk were kept in a cooler until the following morning before delivery.

Milk was delivered to homes of cooperators in the same manner they would receive it from milk plants. Some cooperators received the milk directly from the University Creamery.

Each family was asked to use about four-fifths of each sample and to treat it as they would treat their regular milk supply. The remainder was returned to the laboratory and scored for flavor by a three-member committee of the Dairy Department staff. Acidity tests and bacteria counts were made on all samples.

Flavor Score Card

The following flavor score card was used to score the fresh, control, and returned samples: 40.0—no criticism (excellent); 38-39.5—slightly to moderately off-flavored (good); 35-37.5—distinct off-flavor, distinct absorbed flavor, definitely unpalatable, but still usable (fair); 25-34.5—high acid, bitter, old, stale, generally not usable as a beverage (poor).

Control samples of milk were placed in the laboratory refrigerator (38-40° F.) at time of delivery to cooperators. These samples were not uncapped until they were to be scored for flavor and checked for bacteria count and acidity.

Results of the flavor test are given in Table 1, which shows that the returned pasteurized - homogenized milk scored slightly higher than the pasteurized milk. The flavor score of the former dropped sharply after the fifth day, whereas flavor score of the pasteurized milk dropped sharply after the fourth day.

Regarding the three- and four-day-old milk, both groups had a slight increase in acidity. The five- and six-day-old milk of both groups showed a decided increase in acidity.

There was a slightly greater increase in the bacteria count of the pasteurized-homogenized milk than with the pasteurized milk. This was to be expected since the initial count of the pasteurized-homogenized milk was somewhat higher because bacterial clumps were broken up during homogenization.

The control samples kept in the laboratory refrigerator scored consistently higher in flavor and increased less in acidity and bacteria count than did the milk returned from the cooperators.

Cooperators had been asked to handle the milk in the same manner as their regular milk supply. All refrigerators were checked to see if normal operating temperatures were maintained.

There was a wide variation in the way the milk was handled by cooperators. It is evident that some cooperators were careless in this respect. The housewife can help maintain and prolong the life of good quality milk by prompt refrigeration and seeing that the milk cap is replaced properly when a portion of the bottle of milk is used.

The study showed that there was a slight flavor advantage in favor of pasteurized-homogenized milk, with the exception of the five-day-old milk. After the fourth day, there is a sharp difference of flavor in pasteurized-homogenized milk. Milk that retains good keeping qualities for four days after delivery is satisfactory for every-other-day delivery.

Table 1. Flavor Scores of 322 Samples of Milk Left in 18 Home Refrigerators from 3 to 6 Days Under Summer Conditions

Samples	Score After Refrigeration*			
	3d Day	4th Day	5th Day	6th Day
Pasteurized				
Cooperators	39.5	38.8	38	36
Control Samples	40	39.8	39.5	39.5
Pasteurized-Homogenized				
Cooperators	39.0	38.5	37.1	35.8
Control Samples	39.5	39.7	39.5	39.4

Number of samples used for each kind of milk: 3rd day, 40; 4th day, 40; 5th day, 43; 6th day 38.

*40.0—excellent; 38-39.5—good; 35-37.5 fair; 25-34.5—poor.

S. J. WEESE is Associate Dairy Husbandman and Associate Professor of Dairy Husbandry.

HYBRID CORN

The problem of varietal adaptation is of the utmost importance with the increasing popularity of hybrid corn. The greater uniformity in production per stalk, maturity, ear size, and other characteristics is largely responsible for the increased yield obtained from hybrid corn varieties over open-pollinated varieties. As a result of greater uniformity, the hybrid variety is more exacting in its adaptation.

The Department of Agronomy and Genetics of the West Virginia University Agricultural Experiment Station has an extensive variety testing program to determine the adaptation and yielding ability of hybrid corn varieties. During the past sixteen years, over two hundred trials have been grown throughout the State in which hundreds of corn varieties have been tested. In addition to a large number of experimental hybrids developed at the Station, many hybrids of commercial seed companies and other state experiment stations also have been tested. The trials are not entirely confined to hybrid varieties, as occasionally open-pollinated varieties are grown for comparison with the hybrid varieties.

Each year 5 or 6 trials containing 49 different varieties are grown on Station farms at various locations in the State. These trials are of primary importance to the plant breeder as an aid in the selection of the better varieties from the larger numbers of new experimental hybrids being tested. The more promising new hybrids tested in these trials are then entered in county trials to further study their range of adaptation and yielding ability.

The county trials serve the dual purpose of demonstrations in farmer education and as further testing for the plant breeder. Fifteen or sixteen county trials, each containing nine varieties, are grown every year through the cooperation of the Extension Service and individual farmers. The public is invited to attend a field meeting at the time of harvest of the trials. The field meeting affords interested persons the opportunity to observe and take part in discussion on the performance of different varieties with Agronomists from the Experiment Station.

An annual summary report, *Results of Hybrid Corn Yield Trials*, is made available and may be obtained by writing the Department of Agronomy and Genetics, West Virginia University, Morgantown, West Virginia. From this report farmers may obtain yield information of individual hybrid corn varieties under environmental conditions very similar to those [illegible] own locality.

If a new variety has consistently returned high yields in the region

(Continued on Page [illegible])

Tomato Variety Trials

Largo Hybrid, a late tomato variety, was the best yielder in total pounds of fruit harvested of ten late varieties tested by the Station in 1951.

This tomato, also highest in vigor, required only 2.5 fruits to make one pound. Other high yielding late varieties in the trials were Breeders Hybrid, Stokes Cross No. 4, Stokes Cross No. 3, and Clinton Hybrid.

Early Prolific Hybrid was the best yielder among the early varieties, taking 2.8 fruits to make a pound. This variety, however, was low in vigor and second highest in number of cat-faced fruit.

In all, seven early varieties were tested. Complete yields of both late and early tomato varieties are given in the accompanying charts.—Wm. M. Nixon, assistant in Horticulture.

YIELD OF EARLY TOMATO VARIETIES GROWN AT MORGANTOWN, W. VA. (1951)

VARIETY	SALABLE FRUIT (LBS)*
Early Prolific Hybrid	601
Harris Early Hybrid	509
Wisconsin 55	501
Stokes Cross No. 1	495
Early Red Chief	494
Early Garden State	446
Break O' Day	419

*Harvested from 28 plants from July 23 to October 3.

YIELD OF TEN MIDSEASON TO LATE TOMATO VARIETIES GROWN AT MORGANTOWN, W. VA. (1951)

VARIETY	SALABLE FRUIT (LBS)*
SP48 - 7	261
Stokes Cross No. 4	274
Stokesdale	236
Stokes Cross No. 3	256
Stokes Cross No. 2	234
Breeders Hybrid	281
Rutgers	247
Largo Hybrid	309
Clinton Hybrid	240
Stokes Cross No. 5	219

*Harvested from 12 plants from August 2 to October 2.

POTATO BLIGHTS

(Continued from Cover)

The spores of the fungus on the foliage also may be washed into the soil where they infect the tubers. When an infected tuber is cross-sectioned the rot appears as a reddish brown discoloration beginning at the surface of the tuber and extending into the flesh. In early stages the rot is firm and dry. However, such an infected tuber is very susceptible to secondary soft-rotting microorganisms. Thus, in the field and in storage, it is quite common to find some late blight diseased tubers showing a soft, slimy, wet rot.

The spores of both these fungi are spread by the wind. When a spore lands on a healthy leaf, usually it germinates, penetrates the leaf, and establishes itself inside the leaf tissue. Once the fungus becomes established in the plant there is little one can do to control the disease.

The purpose, then, in spraying or dusting potato plants is to protect them from becoming infected with these disease-producing fungi. When these fungus spores land on a leaf covered with fungicide they are killed before they become established inside the plant. When the blights are threatening, the above-ground part of the plant must be covered with a fungicide. The plants must be sprayed or dusted often enough to *maintain a visible residue upon the plants* at all times.

What fungicide should we use to give maximum disease control and maximum yields? To answer this question, experiments were conducted during the summers of 1950 and 1951 in the Tygart Valley near Huttonsville, West Virginia, where the two blights are an annual problem. Late blight was severe in 1950 and early blight was severe in 1951. Thus there was an opportunity to observe the effect of the different fungicides in control of both diseases.

The data in the chart show the percentage of foliage lost and the yield of U. S. No. 1 Cobbler potatoes from plots sprayed with four of the fungicides and from the unsprayed plot. Zineb, one of the newer materials, gave best disease control and higher yields. The fixed copper fungicide, tribasic copper sulfate, gave good results, but the plants showed a higher percentage of disease and the yields were lower than those from zineb. Bordeaux mixture was almost as good as zineb in disease control, but the yields were lower owing to its toxicity to the plants. Since the sprayed plots yielded from 52 to 79 bushels more per acre than did the unsprayed plots, it is evident that spraying is necessary to get the maximum cash value from the potato crop.

The new material, zineb, should be used at the concentration of 2 or 3 pounds per 100 gallons of water. The fixed copper compounds are used at the rate of 2 pounds of metallic copper per 100 gallons of water. Bordeaux mixture is commonly used at the rate of 8 pounds of copper sulfate and 4 to 8 pounds of lime per 100 gallons of water. These materials control only the foliage diseases of potatoes. To control foliage insects, DDT should be used in all spray mixtures at the rate of 1 pound per 100 gallons of water.

Zineb is a little more expensive than the copper materials, but the increased yields will more than pay for the added cost. If you want to cut the cost of the spray applications, however, you can use the alternating schedule shown in the chart. Here the cheaper copper fungicide was used every other time in alternation with zineb. Disease control was almost equal to zineb alone, but the yields were not as high.

AVERAGE DEFOLIATION AND YIELD OF COBBLER POTATOES SPRAYED WITH DIFFERENT FUNGICIDES DURING 1950 & 1951

HYBRID CORN

(Continued from Page 7)

of its adaptation, it is considered for recommendation by the Experiment Station. Before the new variety can be recommended, however, it must be shown to be definitely superior to comparable hybrids in the same range of adaptation. If it cannot be shown to be superior, it is dropped from the testing program.

The hybrid corn variety testing program thus fulfills the needs of both farmer and plant breeder. In its present form the testing program has helped the farmer to select an adapted high-yielding hybrid corn variety. The plant breeder and the Station have used the variety testing program as a basis for their selections and recommendations of superior hybrid corn varieties for West Virginia farms.—Charles W. Neal, assistant in Genetics.

SCIENCE SERVES YOUR FARM

Bulletin 349, Part 3 Summer Issue June 1952

AGRICULTURAL EXPERIMENT STATION WEST VIRGINIA UNIVERSITY

SCIENCE SERVES YOUR FARM

Bulletin 349, Part 3 | Summer | June 1952

ANNUAL REPORT OF H. R. VARNEY, DIRECTOR
WEST VIRGINIA UNIVERSITY AGRICULTURAL EXPERIMENT STATION
FOR THE PERIOD 1950-1951

IN THIS ISSUE

JUNE—

25. Fifth Annual Dairy Day, Dairy Farm, Morgantown

JULY—

16. WVU Agronomy Field Day, Point Pleasant
24. Horticulture Field Day, WVU Kearneysville Experiment Farm
29-31. State Dairy Show, Jackson's Mill

AUGUST—

4-11. State 4-H Boys' Camp, Jackson's Mill
11-18. State 4-H Girls' Camp, Jackson's Mill
20. State 4-H Poultry Judging Contest, Lewisburg
22. State 4-H Livestock Judging Contest, Lewisburg.
28-30. State 4-H Round-up, Jackson's Mill

SEPTEMBER—

2-3. State Purebred Ram and Ewe Show and Sale, Jackson's Mill
5. WVU Poultry Field Day, WVU Poultry Farm, Morgantown
15-18. State Ayrshire, Guernsey, Holstein, and Jersey Sales, Jackson's Mill
21. State 4-H Sheep Shearing Contest, Jackson's Mill
21-25. State 4-H Livestock Round-up, Jackson's Mill
25-27. Twenty-ninth WVU Junior Farmers' Week and Vo-ag Judging Contests, Morgantown

New Publications

Bulletins

349, Part 2. Annual Report of H. R. Varney, Director, Science Serves Your Farm. March 1952.

351T. Edward S. Elliott. Diseases, Insects, and Other Factors in Relation to Red Clover Failure in West Virginia. April 1952.

352. Faith Wolfe Chalmers, John Joseph Lawless, M.D., and Sam Stregevsky. Nutritional Status of West Virginia University Students. June 1952.

353. Norman Nybroten. Marketing Eggs in Retail Stores of the Northeast, 1949. June 1952.

354. Norman Nybroten. Retailing Eggs in West Virginia Stores. June 1952.

355T. W. F. Porter, Jr. Elk Garden, West Virginia—A Reconnaissance Survey of a Problem Town. June 1952.

Circulars

84. R. Franklin Dugan. Farm Fish Ponds in West Virginia. April 1952.

85. T. B. Clark and C. J. Cunningham. The West Virginia Broiler House. April 1952.

86. T. B. Clark. Selecting Turkeys for the Breeding Flock. June 1952.

SPECIAL GRANTS FOR RESEARCH PURPOSES

Your State Agricultural Experiment Station is constantly doing research aimed to help you. The primary purpose of the Station's research program is to improve agriculture. Improvements in agriculture benefit everyone.

Many materials are necessary to carry on this extensive research program. Most of these materials are purchased with state and federal funds made available for agricultural research purposes. We cannot overlook, however, the contributions (in money and materials) that industry makes to the Station each year. These contributions help swell our research program.

The following is a list (by departments) of the industries and firms that have contributed materials and money to the Station during the calendar year of 1951:

Horticulture

Dow Chemical Company, Midland, Mich.
Plant Introduction Garden, Glenn Dale, Md.
Arnold Arboretum, Jamaica Plain, Mass.
Augustine Ascending Elm Research Association, Chicago, Ill.
Wm. Dieckmann & Sons, Elm Grove, W. Va.
E. I. du Pont de Nemours, Wilmington, Del.
Koster Nursery, Bridgeton, N. J.
Michigan Peat Company, New York, N. Y.
Oglebay Park Greenhouse, Wheeling, W. Va.
Reliance Fertilizer Company, Savannah, Ga.
W. N. Scarff's Sons, Carlisle, Ohio
Simpson Orchard Company, Vincennes, Ind.
V.P.I. Arboretum, Blacksburg Va.
Young's Nursery, Bickmore, W. Va.

Animal Husbandry

Merck & Co., Rahway, N. J. $3,000 grant. To be used for a study of "Coccidiosis and Newcastle Disease" of poultry.

(Continued on page 7)

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SCIENCE SERVES YOUR FARM will be sent free to any resident of West Virginia in response to a written request to the Director, Agricultural Experiment Station, West Virginia University, Morgantown, W. Va.

Attend Field Day at

New Poultry Farm

by T. B. Clark

WINDOWS in new laying house are raised and lowered simultaneously from a hand-powered winch. Windows are tied together with a cable. A winch is located on each floor. Filled bucket makes it easier to raise, lower windows.

WHEN visitors attend our Poultry Field Day in September, they will see many new features on the completely revamped farm located just outside of Morgantown.

For about 10 years we have been developing the new farm, with our best progress made since 1947. The farm adjoins the Animal Husbandry Farm of 200 acres. Our newest building is a two-story laying house that features several labor-saving devices.

The farm, located on the Chestnut Ridge Road near Morgantown, has been established to carry on intensive research work with chickens and turkeys. Heretofore, the main work on turkeys has been done at the Kearneysville branch farm, but the equipment will be moved to Morgantown in a few months. Our complete research program on poultry will then be at Morgantown, except for some broiler rearing work at the Wardensville branch farm. The old poultry farm at Morgantown will be used by animal pathologists in studying poultry diseases. Most of the equipment has been moved to the new farm.

Cables Raise Windows

The new laying house features windows that are attached to cables. This permits them to be lowered or raised in one operation. We raise or lower them with a hand winch. Angle irons attached to the walls serve as watering troughs. A magnetic valve connected to a clock helps to save water during the night periods. We also have installed roosts, three tiers high, that save considerable space.

Other new things planned for the Poultry Field Day, Sept. 5, include several feed elevating devices, a portable manure loading elevator, and new growing porches for turkeys.

Cover

TWO-STORY LAYING HOUSE completed in 1951. The experimental laying flocks are housed here. In this building, Station poultrymen are studying the influence of the proportion of grain to mash on egg production.

Reduced Costs

When plans for the newer buildings were made, every effort was made to design them to keep down labor costs in caring for the chickens and turkeys. We kept in mind our visitors, too, because the alleyways are wide enough so that visitors may walk through the house with ease. This also helps the attendants when they work in the buildings.

Besides the farm superintendent, there are three laborers at the Poultry Farm. In addition, two poultry students serve as watchmen and caretakers at night. They live in a trailer near the main part of the farm.

Heat for the buildings is supplied by unit gas heaters. All of the buildings are ventilated with fans, but during warm days we plan to ventilate by opening the windows and doors.

Detailed tours are planned for the field day. While on tour, farmers will see experiments in progress. Information on results of completed poultry experiments also will be given.

Important Studies

Right now, we have four important studies going on at the Poultry Farm. They are studies of: (1) the effects of roots and heredity on crooked keels in White Leghorns, (2) the effect of selection for broiler qualities in New Hampshires, (3) the effect of the proportion of grain to mash in egg production, and (4) selection of improved hatchability in Broad Breasted Bronze turkeys.

These projects may be completed, in whole or part, by September; then we will be able to pass on results of the studies at the field day. Our last field day was held in 1950 with more than 200 interested persons attending. This attendance is expected to be increased considerably because of the recent additions and improvements at the farm.

Remember, the West Virginia University Poultry Field Day will be held Sept. 5. Come out to the farm if you can.

T. B. CLARK is Associate Poultry Husbandman and Associate Professor of Poultry Husbandry.

COW STALL studies show that it's easier to rest in the modern comfort stalls. Cows kept in comfort stalls produced more milk, kept cleaner, and sustained less injuries than those kept in tie chain stalls. New studies with other types of stalls are now being conducted by Agricultural Engineering and Dairy departments.

Dairy Cow stall studies

by I. D. Porterfield

IN the fall of 1948 a study comparing the comfort stall with the tie chain stall was undertaken in cooperation with the Agricultural Engineering Department. The comfort stall is a trade name and does not differ too greatly from the Hoard type stall. If you compare the comfort stall, as shown in one of the accompanying drawings, and the tie chain stall, you will note that the chief difference between the two is in the width and length of the platform. This would mean that if you were to increase the width of your cow stalls from 42 inches to 49 inches, you would replace seven 42-inch stalls with six 49-inch stalls.

The West Virginia University Agricultural Experiment Station Holstein herd is being used in this study. Each cow spends one winter in the comfort stall and the next in the tie chain stall. In other words, the cows are reversed at the beginning of each winter. Each fall, the first calf heifers are equally distributed, as nearly as possible, in the two types of stalls as they freshen.

What did the cows tell us?

First of all, during one winter the cows in the small tie chain stalls sustained twenty-six injuries, as compared to eight for the cows in the large comfort stalls. Although most of the injuries consisted of bruised hocks and skinned knees, five injuries sustained by the cows in the small stall were of a different nature. They were flank injuries, and knots appeared that approached the size of a volley ball in diameter. Why should this occur? The most logical reason would be that the 42-inch stalls were too narrow. Each time the cow got up or laid down she bruised her flank against the pipe partition.

Severe Injuries

It also was observed that the cows in the small stalls sustained severely bruised hocks. This can be partially attributed to the short 66-inch platform. Sometimes the cows in the small stalls, when lying down, had their rear legs in the gutter, and at other times, even a portion of the udder was in the gutter.

Were the cows in the short, narrow stalls as comfortable as those in the longer and wider stalls? We felt that a partial answer to this question would be to find out how much time the cows spent lying down each day (24 hours). During the winter of 1949-50 we found that the cows in the larger stalls were spending an average of 10 hours and 12 minutes per day lying down, as compared to 8 hours and 48 minutes for the cows in the smaller stalls. Last winter we found even greater differences. The cows in the larger stalls spent an average of 3 hours and 6 minutes more per day lying down than those in the smaller stall.

What did we find at the milk scales? In eight comparisons the cows produced from 12 to 97 pounds more milk per week while they were in the large stall than they did in the small stall. A possible explanation for the difference would be that the cows were more comfortable in the larger stall.

Cleanliness Trials

The results of several cleanliness trials indicate that the cows remained much cleaner in the comfort stall than those in the tie chain stall. It also was noticed that there was no appreciable difference between the two types of stalls in the amount of bedding used nor in the amount of time required to clean them.

A question that remains unanswered is, "Would we have found any difference between the two stalls had the tie chain platform been as wide and long as the comfort stall. At the present time we are comparing the comfort (Hoard type) stall with the conventional stanchion stall and the Dri-Mag (Modified Hoard) stall. The Dri-Mag is a trade name and does not differ greatly from the comfort stall except that the feed

(Continued on page 8)

I. D. PORTERFIELD is Associate Dairy Husbandman and Associate Professor of Dairy Husbandry.

chemical sprays can improve

APPLE COLOR

by Oscar E. Schubert

THE early work of Dustman and Duncan in 1939 at the West Virginia Agricultural Experiment Station demonstrated that soluble thiocyanate sprays will increase the red color on red apple varieties. The proportion of yellow color also was increased in the ground color of red apples for the entire apple in the case of yellow varieties. These thiocyanate sprays did not meet with general approval because the red color produced was a coral pink instead of the normal red with a certain amount of blue, and these sprays caused foliage burn and chlorosis. Later, Uota at the New York Agricultural Experiment Station used sodium diethyldithiocarbamate to increase the per cent of red color on McIntosh. The amount of red color was greater on the treated apples. Slight injury to the leaves and the fruit was observed in some experiments with sodium diethyldithiocarbamate.

1950 Experiments

In 1950, 2,4,5-trichlorophenoxypropionic acid (Color-Set 1004 or 2,4,5Tp), sodium diethyldithiocarbamate, sodium dimethyldithiocarbamate, sodium ethylene bisdithiocarbamate, and 2,4,5-trichloroacetic acid (2,4,5-T) were sprayed on Delicious, Golden Delicious, Rome, and and Stayman apple trees at the West Virginia Agricultural Experiment Station four to six weeks before harvest. Trees similar in size and density of foliage were grouped into blocks and treatments were assigned at random to the trees within each block.

The per cent of red color characteristic of the variety was determined for each apple of the red varieties. Munsell color notations were made on the shaded side of the Golden Delicious apples. These color notations were then converted to a numerical value. A value of 100 was assigned to a desirable yellow color and a value of 0 to an undesirable green color.

No Foliage Injury

Color-Set 1004 was the only material tested that appeared to be promising as a means of increasing the red color on some apple varieties and of improving the yellow color on Golden Delicious. Sodium diethyldithiocarbamate and sodium dimethyldithiocarbamate caused slight fruit injury at the concentration used in the experiment. None of the chemicals caused observable foliage injury.

In 1951, limbs were selected which branched to give closely similar pairs in regard to position and amount of foliage and fruits. Four varieties were used, and 2,4,5-Tp alone or with sodium thiocyanate was compared with checks. Small increases in the per cent of red color were noted for the Delicious, Rome, and Stayman apples harvested. However, since 2,4,5-Tp is an effective stop-drop spray, fewer apples fell from the treated limbs, and one could not be certain that those that dropped from the checks were not the most highly colored ones. On the variety, Grimes Golden, the proportion of desirable yellow color was increased from 5 per cent for the check fruit to 14 per cent for the fruit treated with 2,4,5-Tp and to 42 per cent for fruit treated with 2,4,5-Tp and sodium thiocyanate.

Research Continues

At the present time no definite recommendations can be made for a material to improve the color of apples; however, with progress being made here and at other stations it is expected that chemicals may be found soon that will improve the color of apples.

OSCAR E. SCHUBERT is Assistant Horticulturist and Assistant Professor of Horticulture.

CROPPING SYSTEM

by G. G. Pohlman

THE cropping system that you use on your farm is extremely important in determining the management practices needed to get the best yields. The cropping system also influences the level of yields that can be maintained.

When you set up your cropping system, its nature and the tillage practices that you use are largely responsible for the level of organic matter and nitrogen you are able to keep in the soil. The crops grown and manure returned to the soil are the main sources of organic matter. Your tillage treatments determine how rapidly the organic matter leaves the soil. The organic matter in the soil is responsible for supplying a part of the nutrient elements as well as the proper soil tilth for plant growth.

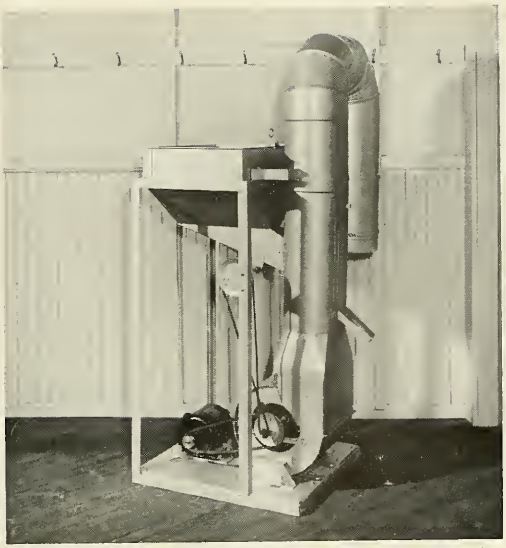
Since 1925, agronomists at the Station have been conducting crop rotation experiments at the Lakin substation. As a result of the longtime use of the land for certain cropping systems, there are plots that gave yields of corn in 1951 ranging from about 18 bushels per acre to 113 bushels per acre. Remember, there is not one "best" rotation, but there are several good ones.

Table 1 shows the corn and wheat yields over a period of seven years at Lakin, where we used legume cover crops and manure.

The results from both crops (corn and wheat) shows the value of using

(Continued on page 7)

G. G. POHLMAN is an Agronomist and Head of Agronomy and Genetics.



BLOWER and cleaner for removal of chaff and other foreign material from walnuts. Equipment recently was remodeled.

MACHINE used to separate kernels from shells. Both of these machines speed processing of black walnuts at Heaters, W.Va.

Black Walnuts Are Profitable

by Roger W. Pease

ARE black walnuts a profitable crop?

For the past several years hulled black walnuts have been selling for about $4 per one hundred pounds. Perhaps it would pay you to market your crop, rather than to let it rot on the ground.

Of course, there are many advantages and disadvantages in growing black walnut trees on your land. The advantages, however, seem to outweigh the disadvantages. This is especially true if your primary uses for black walnut trees are to obtain nut crops and lumber.

For example, a black walnut tree, grown in the open, will produce nuts for many years. When the tree starts to fail, it's time to begin thinking about the lumber it will yield. The stump portion of most of these trees will bring a good price on the market. So, aside from yearly profits from your nut crop, the tree is still valuable when it can no longer produce walnuts. In addition, very little cultural care is necessary for the upkeep of the black walnut tree.

ROGER W. PEASE is Assistant Hillculturist.

One of the disadvantages in harvesting and marketing black walnuts lies in the fact that individual farmers or landowners seldom have a crop large enough to induce the commercial buyer to transport it to the processing plant. Farmers can get around this situation if they pool their crops and have the commercial buyer pick them up at a centralized location. Many West Virginians are doing that at the present time.

What about the market? Will you always be able to sell your walnut crop? For many years the West Virginia University Agricultural Experiment Station has been working on a project designed to find more efficient ways of processing black walnuts.

Processing Storted

Black walnut kernels have been sold over the counter in West Virginia for many years, but the laborious process of hand cracking and separating kernels from shells has limited the volume of sales. Only a fraction of the walnut crop has been used.

In 1944, Station workers, in cooperation with B. D. Marple, of Heaters, West Virginia, inaugurated a project for developing an efficient black walnut processing plant within the State. They believed that such a plant might supply a profitable outlet for the entire walnut crop in its vicinity and thus encourage the opening of other plants. A survey of various out-of-state processing plants was made, machinery selected, and a small walnut house erected.

By 1946, production of kernels exceeded in-state sales and shipments were made out of the State. However, unpasteurized walnut kernels in inter-state commerce are liable to government seizure and condemnation. Adequate pasteurization was necessary.

Existing pasteurizers subjected kernels to very high temperatures, thereby hastening rancidity and causing off-flavor. Station workers developed a method whereby kernels may be thoroughly pasteurized at relatively low temperatures, with no apparent damage to the kernel. Agricultural engineers at the University constructed a pasteurizer based on the results of this research. Meanwhile, Station workers designed a rat-proof walnut house whose capacity would handle the increasing

volume of trade. The pasteurizer was placed on trial in the new walnut house in 1948.

That year was a bumper year for walnuts in West Virginia, while adjoining states had a virtual crop failure. The price of kernels rose sharply, increasing the flow of uncracked nuts to the plant. The trial pasteurizer proved to be basically sound, and made possible the sale of the entire plant output. Approximately twenty thousand dollars was returned to farmers during the year.

That bumper crop brought to light several needs of the plant. The pasteurizer was slow and wasteful of labor; there was no efficient device for sterilizing equipment; an efficient machine for separating kernel particles from pieces of shell and an adequate device for blowing foreign matter from the kernels were needed.

By 1951 all of these needs had been supplied on a trial basis. Station workers had designed a controlled feed elevator that carried the kernels to the pasteurizer and distributed them properly. The Department of Mechanical Engineering had cooperated with the Agricultural Experiment Station in designing and building a trial blower and "granule" separator. Station workers had designed a steam installation for controlling temperatures and humidity in the pasteurizer and sterilizing equipment.

Although the plant is not yet completely efficient, the walnuts, after delivery at the main floor, travel from machine to machine by gravity or elevator until they drop from the pasteurizer into shipping cases. Occasionally a worker must dump kernels into a hopper; but only the removal of black, shriveled kernels from the pasteurized nuts is performed by hand.

Improved processing and pasteurization methods will insure black walnut markets in the future.

SPECIAL GRANTS

(Continued from Page 2)

Cerophyll Laboratories, Kansas City, Mo.
Armour & Co., Chicago, Ill.
Lederle Laboratories, Pearl River, N. Y.
The National Fisheries Institute.

Plant Pothology

Calumet Hecla Corporation. $1,309 for research on copper oxide.
E. I. du Pont de Nemours & Company.

CROPPING SYSTEM

(Continued from Page 5)

TABLE 1. Corn and Wheat Yields at Lakin over Period of Seven Years Using Legume Cover Crops and Manure

Treatment	Without Nitrogen		With Complete Fertilizer	
	bu. per acre		bu. per acre	
	Corn	Wheat	Corn	Wheat
No cover crop	25.3	7.6	46.5	14.3
Red Clover	69.2	11.2	71.3	15.0
Red Clover and Manure	106.0	18.3	112.0	20.9

legumes and manure to supply nitrogen and organic matter in producing good yields of grain crops.

On land that is more rolling and where erosion is a problem, you naturally would not want to produce corn every year. On such rotations you can get equally good yields by merely lengthening the rotation by using sod crops that are legumes.

Table 2 shows how the length of rotation affected the yield of corn over a seven-year period at Lakin.

TABLE 2. Corn and Wheat Yields at Lakin Where the Rotation Was Lengthened over Seven Years

Rotation	Corn	Wheat
	(bu. per acre)	(bu. per acre)
Continuous corn	55.7	—
Corn, wheat	71.3	15.0
Corn, wheat, clover	92.2	26.2
Corn, wheat, clover-timothy, timothy	92.7	24.1

None of the rotations in Table 2 had any manure, but both the continuous corn and the corn-wheat rotation did have cover crops turned under. A year of sod, however, was more effective than the cover crop in increasing both corn and wheat yields. In addition, it gave about two and one-half tons of clover hay. Most farmers need this hay.

The four-year rotation was about the same as the three-year rotation. This probably was because the second year of hay was largely timothy and the residue turned under for corn did not furnish any additional nitrogen.

The Station has over 20 different rotations under test. Those included in this report are some of the outstanding results. These results show that the cropping system used can be an important factor in the production of crops on any farm in West Virginia.

Tennessee Copper Company
Miller Chemical Company
Carbide and Carbon Company
Rohm and Haas
Goodrich Rubber Company
Kodak Chemical Company

Agronomy and Genetics

Rohm and Haas Co., Philadelphia, Pa.
Pearlite Manufacturing Co., Carnegie, Pa.

A WORD ABOUT NEW PUBLICATIONS

Farm Fish Ponds in West Virginia is just off the press. This 36-page publication (Circular 84) is full of information on how to build farm ponds, who to see about getting help, uses of farm ponds, and how and when to stock fish in ponds.

Station Circular 84 was written by R. Franklin Dugan, assistant forester. In addition to the text material, *Farm Fish Ponds in West Virginia* contains more than 30 photographs. This publication would make a wonderful addition to anyone's library.

State poultrymen will be interested in obtaining a copy of Station Circular 85, *The West Virginia Broiler House*, by T. B. Clark and C. J. Cunningham.

This 8-page circular describes in detail the broiler house located on the Reymann Memorial Farms, a West Virginia University Agricultural Experiment Substation. The publication also contains a picture of the house and complete building plans.

West Virginia farmers, especially those in the Eastern Panhandle should keep on the lookout for Station Bulletin 351T, which will be off the press very soon. This bulletin, *Diseases, Insects, and Other Factors in Relation to Red Clover Failure in West Virginia*, was written by Edward S. Elliott. It will contain more than 60 pages and several fine photographs.

You can obtain a copy of any Station publication by writing to the Director, West Virginia University Agricultural Experiment Station, Morgantown.

You also can obtain copies of Station publications at the office of your county agricultural agent.

COW STALLS

(Continued from Page 4)

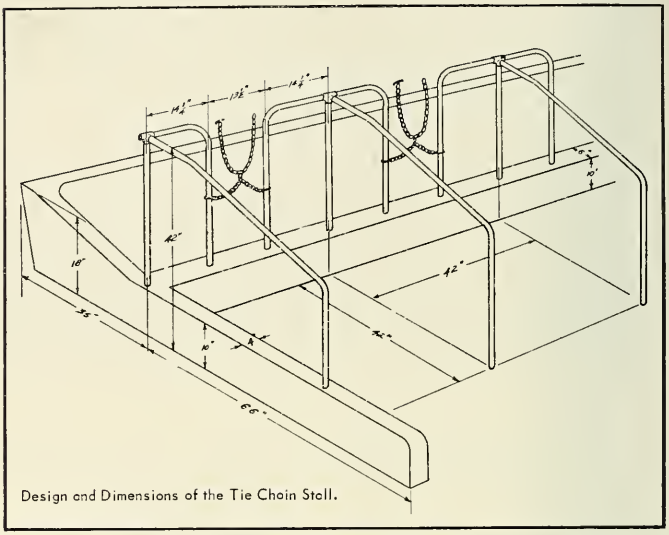
trough is raised and there are no curbs between the stalls or crossbars in the rear of each stall. The stanchion and Dri-Mag platforms are 48 inches wide and 72 inches long. The comfort stall is 49 by 84 inches. Three or four years hence we should be able to arrive at some definite conclusions as to which of these give the best results.

Mats Being Used

At the present time we are attempting to make our old stanchion stalls more comfortable and at the same time save on the bedding bill by using rubber mats. Ten mats are being used. These are made of a mixture of pure rubber, reclaimed rubber, and sawdust. Five mats are one-half inch in thickness and five are three-fourths inch thick. Four of them cover the entire stall platform. Four others lack two inches in length in covering the platform and two are 15 inches short.

In previous work with rubber mats, the cost has been almost prohibitive. However, those were made of pure rubber and were glued to the stall platform. This added substantially to the over-all cost. The type of mat we are now using costs much less. We also are further attempting to reduce costs by not gluing the mat to the stall platform.

If we can reduce the leg injuries and the amount of bedding used, we will consider that the rubber mats will have paid for themselves in two or three years. However, the mats will not solve the problem of short, narrow stalls for mature cows.



Design and Dimensions of the Tie Chain Stall.

Design and Dimensions of the Comfort Stall.