BULLETIN 291 DECEMBER, 1927

Connecticut Agricultural Experiment Station
New Haven, Connecticut

REPORT OF THE DIRECTOR

FOR THE

YEAR ENDING OCTOBER 31, 1927

CONNECTICUT AGRICULTURAL EXPERIMENT STATION
OFFICERS AND STAFF

as of

October 31, 1927

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QUINNIPIACK PRESS, INC., NEW HAVEN

REPORT OF THE DIRECTOR

FOR THE YEAR ENDING OCTOBER 31, 1927.

To the Board of Control of the Connecticut Agricultural Experiment Station:

The year covered by this report is the fifty-second in the history of the Station—a half century that has seen the United States grow in population from 44 million to 110 million, the number of farms increase from less than four million to over six million, and the area under cultivation more than double. Changes of far-reaching and fundamental influence have been wrought in our whole economic and social structure.

Fifty years ago in the vast territory west of the Mississippi there were still unconquered tribes of Indians, herds of wild buffalo and millions of acres of cheap land, the too rapid settling of which brought disaster not only to the farmer but to the nation as a whole. There was no telephone, no automobile, the radio was undreamed of and the railroads were just beginning to reach out into the great central grain and cattle country. In 1875 the reaper was a relatively new tool; last season in a single day, a Kansas farmer and his son harvested and threshed 100 acres of wheat with a "combine." In Connecticut we were growing our own fresh beef, mutton and pork—the first refrigerator car reached New York in 1879. Creameries manufacturing butter and cheese were to be found in almost every town in the State. A few far-seeing men had sensed the changes that were to come, and many more had only a vague feeling of uneasiness—they saw cheap grain, wool, meat and butter flooding New England, and some predicted the everlasting ruin of our New England agriculture.

Out of this was born the Experiment Station Idea, not to stay the hand of change and progress but to discover the fundamental laws of plant and animal life upon which the new agriculture was to be built—an agriculture that in Connecticut has discarded unprofitable fields, crops and flocks, but which today produces over twice the *actual* wealth of 1875.

To enumerate all of the Station's contributions to this process of evolution would be tedious. Some of the most outstanding are: the discovery of the cause of potato scab; the introduction of spraying to control plant pests; the study of the chemistry of the vegetable proteins which led to discovery of the vitamines and a knowledge of the food value of milk and other farm products; the introduction of shade for tobacco growing; bulk fermentation of tobacco; better methods of fertilizing this important crop; a new method of corn breeding which has completely changed our methods of improving this cereal.

During all these years the Station has continued its important "defense" work, annually collecting and analyzing thousands of samples of fertilizers, feeds, foods and drugs; has inspected the orchards and nurseries and kept down the toll of insect and fungous damage. But the two-fold function of the Station was recognized from the beginning, for while the first director believed thoroughly in performing the direct services of control and education, he wrote in his first report, "the Experiment Station will be worthy the name in proportion as it carries on accurate and thorough investigations in agricultural science."

FIG. 1.—The Station Agent drawing a sample of fertilizer.

REVIEW OF THE YEAR

During the year under review, the work in all departments has gone forward without interruption and with gratifying results. It is a particular pleasure to here acknowledge the debt of the Station, and especially that of the director, to Dr. E. H. Jenkins, Director Emeritus, for his constant interest and wise counsel.

CONTROL AND INSPECTION WORK

INSPECTION OF FERTILIZERS, FEEDS, FOODS, DRUGS, ETC.

In accordance with the statutes assigning these duties to the Station, the Chemical Laboratory has examined during the year 884 samples of fertilizer, lime and similar materials, of which 507

were drawn officially by the Station Agent and the balance received from farmers. The annual report on fertilizers was issued as usual in December.

Under the new feeding stuffs law, which went into effect July 1, 1925, all "Commercial Feeding Stuffs" offered for sale must be licensed. For the year 1927, 177 firms registered 793 brands. For the inspection of these, 670 official samples were drawn, which with other samples received required 898 complete analyses.

As usual much time was consumed in the analysis of foods and drugs, the samples being collected by the State Dairy and Food

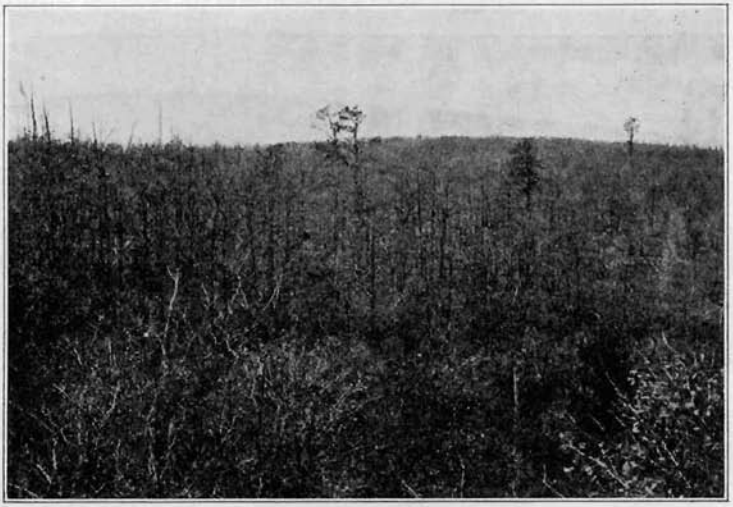

FIG. 2.—Part of a large area, outside of Connecticut, completely defoliated by the Gipsy Moth—photograph taken July 15. Courtesy of Dr. A. F. Burgess, U. S. D. A.

Commissioner and also by the Station Agent. Reports on 1100 food products and 150 drug products were published in Bulletins 286 and 287 respectively.

In addition to the above the laboratory calibrated 3100 pieces of Babcock glassware, examined Insecticides and Fungicides offered for sale in the state and made a large number of miscellaneous analyses, including several submitted by the newly-created State Water Commission.

CONTROL OF INSECT PESTS

The problems of insect and disease control are becoming more and more difficult each year as new pests appear in the State. The campaign against the *Asiatic Beetle,* which was discovered two

years ago in the city of New Haven, has been carried on vigorously. During the past year lawns in a large area in the Westville district were again treated with Carbon Disulphide Emulsion and very encouraging results obtained. In addition, a strict quarantine on the moving of soil from this area was enforced. Studies of the Asiatic Beetle indicate that it probably will never be a serious pest in this climate, and the treatment, above mentioned, offers an effective control against damage to lawns.

The *Japanese Beetle* has spread from the region of Philadelphia into New York and southwestern Connecticut. Cooperating with the United States Department of Agriculture, the Station enforced

FIG. 3.—Anti-mosquito Work—cleaning out an old ditch.

a quarantine on farm products and plants bearing soil as shipped out of the New York metropolitan district. This required a twenty-four-hour patrol on the Boston Post Road near Stamford as well as on other roads in this region. The quarantined area now includes most of Fairfield County and will require continued inspection, scouting and patrolling.

As usual members of the Station staff inspected all *nurseries* in the State and issued permits for the importation and shipment of nursery stock. Here again there is a steady increase in the amount of service required.

In the control of the *Gipsy Moth* we have continued to wage a successful battle. By intensive scouting, spraying and destruction of egg clusters it has been possible to prevent any injury within

the borders of the State. In adjoining states, where funds were not available, serious damage occurred during 1927.

The *European Corn Borer* has continued to be a constant threat since its introduction into the State some five years ago. However, the number of infestations discovered each year has been small, never numbering over six. All corn stalks and weeds have been destroyed in the neighborhood of each infestation found, thus undoubtedly preventing the serious spread of this insect. The cordial cooperation of the United States Department of Agriculture has greatly aided in all of our work.

While the State appropriation for the *elimination of mosquitoes* was not increased it was possible to arouse a very lively interest

FIG. 4.—Station crew eradicating wild Ribes from pine land.

in New Haven and the surrounding towns with the result that the several Chambers of Commerce undertook the raising of a fund of $40,000 for completing the drainage work in this district. Results have been very encouraging and the plans now call for commencement of operations in the spring of 1928.

In addition to the above, all apiaries in the State were inspected for European Foul Brood, many orchards and gardens were visited and general assistance rendered in the control of insect pests.

WHITE PINE BLISTER RUST

During the season of 1927, 159,121 wild Ribes and 2,235 cultivated Ribes were destroyed on 20,904 acres. The work was carried on in 16 towns. 10,400 acres of white pine were protected.

In addition 20,100 acres of non-pine land were eliminated in the general pine region. Approximately 1,000 acres of land adjoining 10 commercial nurseries were freed from Ribes as a preliminary step in an effort to secure a modification of the Federal quarantine on white pine shipments out of the state. The nurserymen cooperated with us in this sanitation work.

All eradication this year represents cooperative effort on the part of the state and towns, individuals and nurseries.

Experimental work was conducted to study some of the factors that make up crew efficiency.

Comparative figures for the last three years are given below:

Year.	Initial eradication Acres.	Re-eradication Acres.	Total eradication Acres.	Wild Ribes Pulled.	Cultivated Ribes Pulled.	Area pine protected Acres.	Nursery sanitation Acres.
1925.....	6,688	40	6,728	258,515	684	?	0
1926.....	21,687	570	22,256	182,826	330	7,400	0
1927.....	12,068	8,836	20,904	159,121	2,235	10,400	1,000

The drop in acres eradicated in 1927 from that in 1926 is due to the fact that more time was devoted to experimental and sanitation work, and to the scattered location of the eradication areas.

SEED TESTING

The total number of seed samples tested during the year, November 1, 1926, to November 1, 1927, was 416. These were from 73 sources and comprised 43 different species of plants.

Last year a special inspection was made of vegetable seed sold in packets and reported in Bulletin No. 283. This year the study was confined to bulk seed obtained chiefly from the market gardeners. Only fair germination was obtained.

PROGRESS OF INVESTIGATIONS

BIOCHEMISTRY

The Chemistry of the Proteins. Much time has been devoted to a revision of the standard procedure for the separation of histidine from arginine, as these two basic amino acids not only appear to form an important part of the base fraction from yeast but are also found in many other materials. A method has been developed which is much simpler and more expeditious than that formerly employed and is practically quantitative.

The great difficulty in dealing with yeast and other extracts has been the selection of a method for separating the bases from other substances which form insoluble precipitates with phosphotungstic acid. This reagent has been widely employed upon the assumption that the nitrogen precipitated by it belonged to bases. The presence of peptides in extracts of plant material renders this

assumption unwarranted, and attempts to isolate derivatives of basic substances gave results which fall far short of those to be expected from their nitrogen content. Until methods are developed whereby peptides can be quantitatively removed, further progress in the analysis can only be made by hydrolysis of the peptides to their constituents of amino acids before the precipitation of the bases. Papers on these phases have been published in the Journal of Biological Chemistry and the Journal of Plant Physiology.

Experiments in Nutrition. The investigations on the rate of growth have been continued as a major study. As reported last

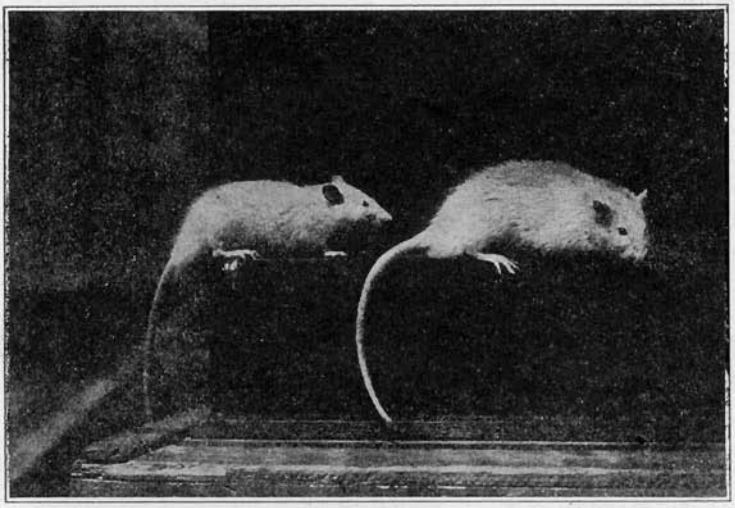

FIG. 5.—Two rats from the same litter. Age 79 days.
Left—Diet, standard. Weight, 160 gms.
Right—Diet, high protein + alfalfa and liver. Weight, 301 gms.

year, growth at a rate of three times the average rate was secured with a number of animals. Subsequent experiments have confirmed this, not only with casein furnishing the protein but also with rations containing edestin, lactalbumin and cottonseed globulin. Liver, lettuce and yeast added to rations previously considered sufficient have all produced these results, but there are indications that a combination of two of these is more effective. Fresh alfalfa leaves, in daily quantities that compare favorably with lettuce, have proved to be notably potent. Studies dealing with the effect of high protein diets upon various physiological functions have been continued and a report published; also the effect of diet on the reproductive organs and the construction of bone.

BOTANY

Mosaic. The year 1927 has been the most favorable one we have known for some time for the development and spread of mosaic troubles of all susceptible hosts. This was because of the favorable weather and abundance of insect carriers, especially lice. Over-winter weed-carriers were observed in some cases in the vicinity of fields of infected cultivated plants.

The chief new observation along microscopical lines was the finding, in a certain type of mosaic sent us by Dr. Valleau of Kentucky, of definite inclusions in the nucleus of infected cells. These were similar to the common "plate crystals" found in the cell outside.

In 1926 a most interesting discovery was the fact that tobacco leaves dried and preserved in the herbarium for 24 years, still

FIG. 6.—Effect of Mosaic on Summer Squash.

carry the active principle and could be used to infect living plants with the mosaic disease. Infection experiments continued this year with old dried leaves and preserved juice gave similar results.

Experiments with New Seed Disinfectants for Potatoes. The results of our experiments with the three fungicides tried, Semesan, Formalin and Mercuric Chloride, showed no positive stimulating effects for any of them over the check as regards earliness of first vines to appear, earliness of vines as a whole, size or vigor of the vines, or increased yields of tubers. The experiments were carried on in triplicate with two varieties of potatoes.

Spraying and Dusting of Apples. The results from the several treatments on the orchard of F. N. Platt, Milford, in 1927 were not as good as for the past few years. This was due to the excessive rainfall during the latter part of the season which caused an unusual development of fungous diseases, especially apple scab infection late in the season.

Five different treatments were used: complete spray schedule, complete dust schedule with each of two dusts, Pomodust and Kolodust; and two combinations of dust and spray. Contrary to the usual performance of these materials the Kolodust gave the best control of scab, with Pomodust second and spray third. We find this was doubtless due to the fact that the calyx treatment of dust was put on immediately before a three day rain period during which the maximum discharge of scab spores took place, while the spray was not put on until after this period.

Spraying gave considerably better control of sooty blotch and fruit speck than did the dust.

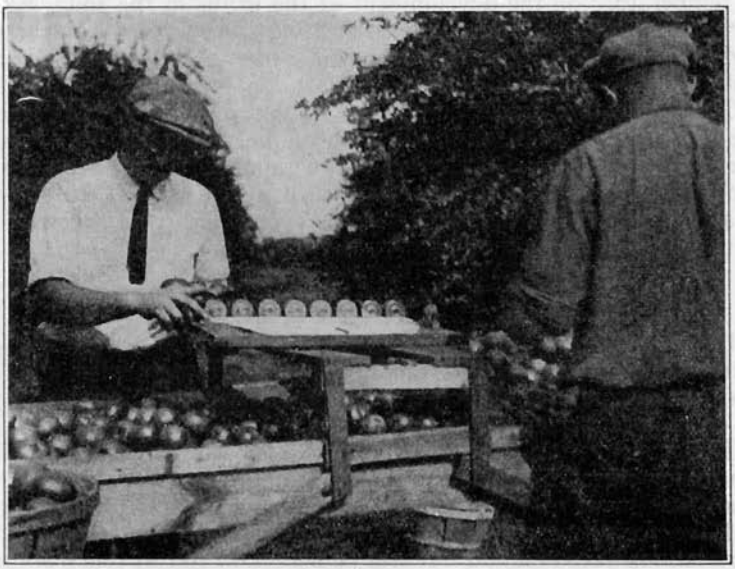

FIG. 7.—Scoring Apples in the Spraying and Dusting Experiments at the F. N. Platt orchard.

ENTOMOLOGY

Further investigations have been conducted on the life history, habits and control of the *Oriental peach moth.* Considerable data have been obtained from field cages and bait pans placed in the orchard. Three broods were evident, the same as in 1926. Considerable work has also been done towards developing a substitute for arsenical sprays which promise to be less toxic to human beings and cause less injury to peach foliage. Thus far, sprays have not been effective in controlling the insect. One parasite, *Macrocentrus ancylivora* Rohwer, was reared in considerable numbers the past season from one orchard, and work is also in progress in

the artificial breeding of an egg parasite, *Trichogramma minutum* Riley, which infests the eggs of the Oriental peach moth in Connecticut.

The study of the *Plum Curculio on apple* has been continued as a part of the five-year program on this subject. During the year, jarring records have been kept and field tests continued with sprays applied at different times, and with fish oil as a sticker with a view to eliminating some of the sprays.

The studies of the life history, habits, and distribution of the *Asiatic beetle,* begun in 1926, have been continued and nearly completed. These include many temperature records and the effect of temperature on the development of the grubs in the soil. Experiments have also been made in treating soil with lead arsenate and other materials before seeding, in order to render the lawn grub-proof.

The life history and habits of the *Imported Birch Leaf Miner,* are being investigated, and the length of the various stages of the life cycle have been determined. The number of generations is probably three, but another season's work is necessary to settle this point. Several insecticides have been tried as a means of control, but so far none has proved satisfactory.

FORESTRY

Under the Clark-McNary Act 194,000 trees were distributed to private owners and 445,000 under the usual Station plan which has been in force for a number of years and whereby farmers pay all costs except overhead.

The investigation of *soil as a site factor* has continued to be the major research problem. In 1926 and 1927 a very thorough study was made of two tracts. The soils were carefully mapped and the forest vegetation listed and measured. No significant correlations have resulted. It will be necessary to test this method on forests of known history which is now being done on pine plantations. In 1927 a very careful study was made of the lesser vegetation in several tracts in an attempt to establish indicator plants or groups of plants. The tentative conclusion reached is that the history of the stand has greater influence on the lesser vegetation than the soil type.

PLANT BREEDING

A sterile tassel character in white flint corn has been found to be controlled by an inherited factor linked with the factor for white seed color. The possibilities of using this character in the production of crossed corn seed are being investigated. By backcrossing, this character is being transferred to several different types of sweet corn and field corn.

Inbred strains in the twentieth generation of self-fertilization have been separated into two strains in each line and are being continued for another period of continuous inbreeding to determine their fixity and trueness to type and the effects of long continued inbreeding.

Thirteen crosses of inbred strains of Evergreen sweet corn have been selected out of nearly 200 crosses as promising for canning purposes. These are being tested further.

A large number of self-fertilized lines of early yellow sweet corn are being selected for the purpose of producing a desirable market garden type.

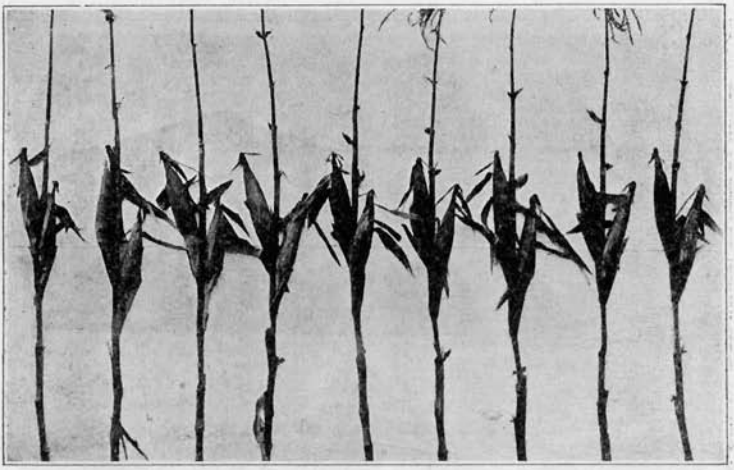

FIG. 8.—Red Leaved White Evergreen, a cross of inbred strains of Sweet Corn. Note uniform earing.

A method of combining a number of inbred strains of field corn and crossing two such combinations, called "multiple crossing," is being tried out to simplify the production of crossed seed corn on a large scale.

Inbreeding and selection are also being applied to some of the naturally cross-fertilized vegetables. It has been found that about 15 per cent of carrot plants set seed from their own pollen. Onions and beets are being self-fertilized for the first time this year. A number of self-fertilized lines of black raspberries are in their second generation and of strawberries in the second generation. Both series are showing many important differences. The strawberries have notably declined in vigor and productiveness and therefore will presumably give the same response to crossing as corn.

Several selections of a cross of Cuban and Broadleaf tobacco have been backcrossed to Cuban from one to four times. The number of generations of backcrossing to restore the main type of one of the parents while retaining a few of the most valuable characters of the other parent is being determined.

Pure line selections are also being made in tobacco, lettuce, lima beans and peppers to find out possibilities for improvement by this method.

SOILS

In the attempt to identify all of the soils of the state 51 different series have been classified. When these are divided into

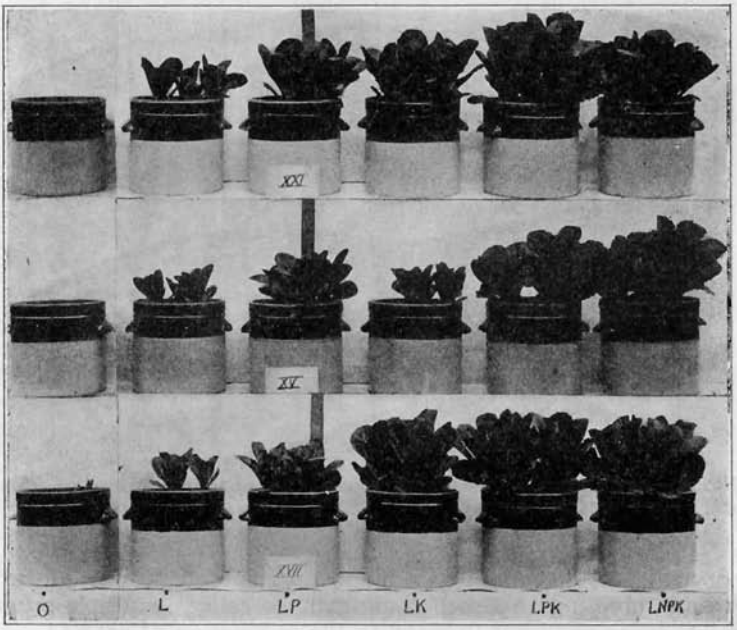

FIG. 9.—Crops Vary in their Fertilizer Requirements on Different Soils. Growth of lettuce on three different soils with treatments as follows:

O—Nothing.
L—Lime.
LP—Lime and Phosphorus.
LK—Lime and Potassium.
LPK—Lime, Phosphorus and Potassium.
LNPK—Lime, Nitrogen, Phosphorus and Potassium.

On Soil XXI there is an almost equal response to Phosphorus and Potassium. On Soil XV there is a marked response to Phosphorus, but a slight response to Potassium until Phosphorus has been applied. Soil XVII shows only slight response to Phosphorus but very large benefits from Potassium.

types we find over 150 distinct soils represented in Connecticut. The major problem has been to devise a workable agronomic classification of these many types, which are taxionomically different. Some progress can be definitely reported. The 51 soil series can be divided into 10 major groups, which with some sub-grouping make 15 in all. A key has been worked out for the use of county agents or other workers.

Greenhouse studies were conducted on 22 soils representing 12 distinct types. All but three show a marked response to lime. Potash produced some increase on all but two soils, but on five only was it as valuable as phosphorus.

An outgrowth of the laboratory studies was the discovery that old tobacco soils are very high in available phosphorus and as this was confirmed by field tests at the Tobacco Station, farmers have been advised that phosphorus applications may be reduced in such cases. (Tobacco Bulletin No. 7).

TOBACCO SUB-STATION

The fertilizer experiments, coupled with the studies of the soil department, have shown definitely that old tobacco soils do not respond to applications of phosphoric acid in any form. It appears that there are large accumulations in available form in these fields and growers may therefore omit or greatly reduce the application of phosphoric acid which is usually in the form of precipitated bone.

On the extensive *"source of potash"* plots, carbonate of potash has so far given the best quality of leaf. Double manure salts are of no advantage over sulfate of potash.

During the last two years over 1,500 tobacco soil samples have been tested for *acidity*. All cases of Black Root rot have fallen above 5.6 pH, the worst being above 6.0 pH. (Tobacco Bulletin No. 8).

In cooperation with the Bureau of Chemistry, U. S. D. A., we have tested *shade cloth treated in various ways to increase its life*. Untreated cloth loses 47% in strength in one season, while treated cloth lost but 5%. Thus, it would seem that the treatment makes possible a second season for the cloth which is usually discarded after one season. Cloth costs $150 to $200 per acre. Treatment adds 15% only to this cost. The process therefore should effect very material savings. From the standpoint of the yield and quality of the tobacco the yellow, treated cloth is just as satisfactory as the untreated.

In the *topping and suckering experiments* the best results have been obtained when plants are topped four leaves below the first bald sucker, at the time of the opening of the first flowers. Removing suckers twice seems to give the optimum results.

Field Days and Exhibits

Since the purchase of the Mt. Carmel Farm in 1911, no field day had been held on the Station grounds on Huntington Street, the farm being considered a more suitable place. This year it was decided to set aside June 3rd as a special day for inspection of the work being conducted in the laboratories and greenhouses. The Connecticut Dairymen's Association voted to make this their summer meeting and special attention was given to a discussion of alfalfa as a crop for dairy farms. Mr. J. S. Owens and Mr. Raymond Clapp of the Extension Service gave us excellent cooperation. The address by Dr. G. F. Warren of the Cornell College of Agriculture was particularly well received.

The Annual Field Day at the Tobacco Station in Windsor was held on August 2nd with a large attendance. Dr. H. J. Wheeler gave the principal address.

Fig. 10.—Tobacco Exhibit at the Connecticut State Fair—September, 1927.

One of the most successful and attractive exhibits ever shown by the Station was that prepared for the New Haven Progress Exposition held in February, 1927. Five large wall panels were used to illustrate the principal agricultural industries of Connecticut—Dairy, Poultry, Vegetables, Tobacco, Fruit and Forestry. Before these on tables were arranged material showing how the Station serves each of these enterprises.

For the Connecticut State Fair in September this same exhibit was shown, and attracted much attention.

Changes in the Station Staff

Appointments:

W. R. Singleton, S.M., Assistant Geneticist, March, 1927.
H. J. Lutz, M.F., Assistant Forester on Purnell Project, June, 1927.
T. R. Swanback, B.S., Scientific Assistant at Tobacco Station in Windsor, June, 1927.
G. P. Zundel, M.S., Assistant in Botany, July, 1927.
J. P. Johnson, B.S., Deputy in Charge of Asiatic and Japanese Beetle Quarantine, July, 1927.
David S. Walden, B.S., Assistant Chemist, August, 1927.

Resignations:

P. C. Mangelsdorf, S.D., Assistant Geneticist, January, 1927.
Willis R. Hunt, Ph.D., Scientific Assistant in Botany, July, 1927.

Physical Equipment

Additions to the Station's scientific equipment included a Spencer Binocular Microscope for plant pathological work, a Bausch and Lomb Petrographic Microscope for soils investigations, a High Pressure Autoclave for hydrolysis of proteins, a Lovibond Tintometer, a Saybolt Viscosimeter, an electric refrigerator, and a Leitz Research Microscope for cytological studies in plant breeding.

Additions to the library of permanent value were 900. Of these, 100 were bound books and the balance journals and the like which are bound by the Station. The total number of volumes on October 31, 1927, was 16,600.

PROJECTS ACTIVE DURING THE YEAR

Analytical Chemistry

Dr. E. M. Bailey in charge

1. Inspection of Fertilizers.
2. Inspection of Feeding Stuffs.
3. Inspection of Foods and Drugs.
4. Calibration of Babcock Glassware.
5. Inspection of Insecticides and Fungicides.
7. Analysis of Diabetic Foods.

Biochemistry

Dr. T. B. Osborne in charge

(In Collaboration with Dr. L. B. Mendel, Yale University)

I. Nitrogenous Constituents of Plants.
   1. (a) The nature of the simpler nitrogenous constituents of yeast.

(b) The protein and non-protein nitrogenous constituents of the tobacco leaf.

2. (a) Possible means of improvement in the methods for the determination of basic amino acids of proteins.
   (b) Methods for the preparation of pure proteins on the large scale necessary for obtaining material for chemical and nutritional studies.

II. Nutrition Investigations.
   1. Certain factors in the diet which appear to be responsible for extraordinarily rapid growth.
   2. The relation of diet to opthalmia.
   3. The relation of diet to fertility in cooperation with Dr. Mason of Vanderbilt University.

Botany

Dr. G. P. Clinton in charge

1. The Effect of Fertilizers, Especially Nitrate of Soda, on the Growth, Yield, Longevity and Yellows of Peaches. (*Terminated during this year*).
2. The Nature and Cause of Mosaic Disease of Plants.
4. The Rusts of Connecticut.
5. Plant Disease Survey of Connecticut.
6. *Thielavia Basicola*, a Study of the Perfect Stage.
7. A Study of *Pythiums*.
8. Comparison of Spraying and Dusting on Apples and Peaches.
9. Control of Celery Blights with Sprays and Dusts. (*Terminated during this year*).
13. Peach "Yellows."
15. Chestnut Blight—virulence studies.
21. Influence of Bud Inheritance on Yield of Peaches. (*Terminated during this year*).
22. Influence of Root Grafts on Scions of Apples. (*Terminated during this year*).

Entomology

Dr. W. E. Britton in Charge

1. The Life History, Habits and Control of the Plum Curculio on Apple.
2. Comparisons of Spraying and Dusting on Apples and Peaches. (See Botany).
6. Control of Foul Brood of Bees.
7. A Study of the Asiatic Beetle, *Anomala orientalis*.
9. Insect Survey of Connecticut.
14. A Study of the Chemical Changes in Standard Spray Mixtures.
15. Bionomics of the Birch Leaf Skeletonizer, *Bucculatrix canadensisella*.
16. Experiments with Baits Attractive to the Cabbage Maggot Fly.
17. Life History and Methods of Controlling the Oriental Peach Moth, *Laspeyresia molesta*.
18. Life History of Imported Current Worm.
20. Life History, Habits and Control of the Imported Birch Leaf-Miner, *Fenusa pumila*.
21. Life History and Control of the Spinach Leaf-Miner.
22. Insects Infesting Nursery Stock in Connecticut.
23. Spraying to Control the Spruce Gall Aphid.

Control Projects

10. Inspection of Orchards and Nurseries.
11. Control of Gipsy Moth.
12. Elimination of the Mosquito Nuisance in Salt Marshes.
13. Inspection of Apiaries.
19. Control of the European Corn Borer.
24. Control of the Asiatic Beetle.

FORESTRY

Mr. W. O. Filley in charge

1. Experimental Plantations on a Sandy Tract at Rainbow.
   a. Comparison of a wide variety of conifers and hard woods.
   b. Methods of management for those species that have survived.
   c. Studies on growth and habits of the several species.
2. Effect of Thinning in White Pine (At Shaker Station)—Three Grades of Thinning.
3. Effect of Thinning in Hard woods (At Quassipaug Lake).
8. Studies of Forest Plantations (State-wide).
   a. Comparative growth of various species.
   b. Reasons for success or failure.
   c. Soil and other site factors necessary for success of each species.
10. Distribution and Growth of Forest Trees as Influenced by Soil Conditions.
   a. To determine the basic factors inherent in forest soils which influence the natural growth and distribution of trees.
   b. To study the natural distribution of tree species and forest types with reference to soil.
   c. To study the growth and yield of forests as influenced by soil factors.
11. Coniferous Seed Bed Study to Determine:
   a. The value of fertilizers in seed beds.
   b. The value of different amounts of seed.
   c. The value of Dusts and Sprays in preventing damping off.

Control Project

7. Control of White Pine Blister Rust.

GENETICS (PLANT BREEDING)

Dr. D. F. Jones in charge

1. A Genetic Study of Hereditary Characters in Corn Involving Their Linkage Relations and Variability.
2. The Effects of Inbreeding and Crossing Upon Corn in Relation to Vigor, Rate of Growth, Productiveness and Variability.
3. Methods for the Improvement of Naturally Cross-Fertilized Plants by Selection in Self-Fertilized Lines—with Particular attention to the Monoecious, Wind-Pollinated Corn Plant.
4. Methods for the Improvement of Naturally Self-Fertilized Plants—with Particular Attention to Tobacco.

Soils

Mr. M. F. Morgan in charge

1. What Soil Characters are Factors in Determining the Agronomic Value or Utilization of Land?
2. Experiments in Lawn Fertilization.

Tobacco Sub-Station at Windsor

Dr. P. J. Anderson in charge

1. Fertilizer Experiments on Yield and Quality.
   a. Sources of Nitrogen.
   b. Rates of Phosphoric Acid.
   c. Sources and Rates of Potash.
   d. Fractional applications.
   e. Stable Manure.
2. Strain Tests of Havana and Broadleaf.
3. Improvement of "Cuban" Shade Tobacco.
4. Effect of Cover Crops.
5. Brown Root Rot (Tobacco Sick Soils) with U. S. D. A.
6. Black Root Rot—relation of soil reaction.
7. Trials of Cigarette Types of Tobacco.
9. Tests of Chemically Treated Shade Cloth—with U. S. D. A.
10. Role of Humidity and Temperature in Curing.
11. Role of Nitrogen and Sulfur in the Metabalism of the Tobacco Plant.
12. Topping and Suckering—the effects at different Heights and Dates.
13. The Effect of Fertilizers (Acid or Alkaline Residues) on Black Root Rot.
14. Control of Wire Worms in Tobacco.

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Bulletins

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No. 284. Index to Reports on Food Products and Drugs, 1915-1925.
No. 285. Report of the State and Station Entomologist.
No. 286. Report on Food Products and Drugs, Part I.
No. 287. Report on Food Products and Drugs, Part II.
No. 288. The Biology of the Birch Leaf Skeletonizer.
No. 289. Report on Commercial Feeding Stuffs.

Tobacco Series

No. 7. Phosphorus on Tobacco Soils.
No. 8. Report of the Tobacco Station at Windsor (1926).

Circulars of Immediate Information

No. 55. Asiatic Beetle Quarantine.
No. 56. Japanese Beetle Quarantine.
No. 57. Regulations Concerning the Transportation of Nursery Stock in the United States and Canada.
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WHAT THE STATION CAN DO

Each mail brings to the station requests for information and service, the range of subjects being almost without limit. Every effort is made to comply with these requests, even though they are outside the fields under investigation. This is one of the purposes for which the library is maintained. However, some of the letters request help that requires an intimate knowledge of live stock management and the like and again we are asked to make laboratory determinations for which we do not have the equipment or staff. Therefore it is helpful to publish from time to time a list of the subjects on which we can furnish information and the kinds of samples we can accept.

The Station can furnish information on:

Fertilizers and fertilization.
Soils and their management.
The chemical composition of Foods, Drugs, Insecticides and Fungicides.
The composition of Diabetic Foods.
Insect Pests of plants and their control.
Fungus and other Diseases of plants and their control.
Sprays and spraying.
Fruits and fruit management.
Weeds and their control.
Forestry—all phases.
Care of Shade Trees.
Plant breeding—especially field and sweet corn.
Lawns, establishment and care.
Bees.
Mosquito Elimination.
Tobacco culture.

Samples and specimens that can be analyzed, tested or identified:

Fertilizers.
Feeding stuffs.
Foods and Drugs.
Milk—except for bacterial count.
Seeds.
Weeds and other plants.
Insects.
Diseased and injured plants.
Soils.

The Station cannot furnish information on:

Live stock feeding and management, including Poultry.
Animal diseases.
Household management.
Clothing.
Farm management.
Marketing and coöperation.

Requests for information on these subjects should be sent to the Connecticut Agricultural College at Storrs.

The Station cannot make analyses and examinations of:

Drinking water—apply to the State Board of Health, Hartford.
Milk for bacterial content—apply to the Dairy Commissioner, Hartford.
Sick or dead poultry should be sent to Poultry Department, Storrs Experiment Station, Storrs, Conn.

All of which is respectfully submitted.

WILLIAM L. SLATE,
Director.