TWENTY-SECOND ANNUAL REPORT

FOR 1902-1903

METEOROLOGICAL SUMMARY.

PRESS BULLETINS.

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OHIO

Agricultural Experiment Station

WOOSTER, OHIO, U. S. A, JUNE, 1903

BULLETIN 143

The Bulletins of this Station are sent free to all residents of the State who request them. Persons who desire their address changed should give both old and new address. All correspondence should be addressed to

EXPERIMENT STATION, WOOSTER, OHIO.

Twenty-second Annual Report

OF THE

Ohio Agricultural Experiment Station

For the Year ending June 30, 1903.

Published by Order of the State Legislature.

WOOSTER, OHIO
EXPERIMENT STATION PRESS
1904

ANNOUNCEMENT.

The Ohio Agricultural Experiment Station is organized under an act of the General Assembly of Ohio, passed April 17, 1882, and supplemented by an act of Congress approved March 2, 1887.

The Station is prepared to test new varieties of grain, fruits and garden vegetables; to examine seeds that are suspected of being unsound or adulterated; to identify and name grasses, weeds and other plants; to identify insects and suggest measures for the control of such as are injurious; and to give advice concerning the prevention of the fungous diseases which affect vegetation.

The Station is not prepared to give advice respecting contagious diseases of animals, that function having been transferred to the State Board of Agriculture in its capacity of State Live Stock Commission.

The Station is not prepared to furnish analyses of chemical or commercial fertilizers, as in Ohio that work is performed under direction of the Secretary of the State Board of Agriculture, at Columbus; but the Station will at all times respond to requests for advice concerning the use of such fertilizers.

The Station is not prepared to examine foods and dairy products suspected of adulteration, as that work is in charge of the Ohio Dairy and Food Commissioner, whose office is at Columbus.

Any citizen of Ohio has the right to apply to the Station for any information it can give, and all such applications will receive prompt attention.

Visitors to the Station are always welcome.

Address all communications to

EXPERIMENT STATION,

Wooster, Ohio.

ORGANIZATION OF THE

OHIO AGRICULTURAL EXPERIMENT STATION.

BOARD OF CONTROL.

John Courtright, *President*	Ashville
D. L. Sampson, *Secretary*	Cincinnati
W. I. Chamberlain, *Treasurer*	Hudson
George E. Scott	Mt. Pleasant
H. L. Goll	Stryker

STATION STAFF.

DEPARTMENT CHIEFS.

	Department
Charles E. Thorne, M. S. A., *Director*	Administration. Soils
William J. Green	Horticulture. Forestry
Augustine D. Selby, B. S.	Botany
C. G. Williams	Agronomy
John W. Ames, M. S.	Chemistry
H. A. Gossard, M. S.	Entomology
B. E. Carmichael, B. S.	Animal Husbandry
E. B. Forbes, Ph. D.	Nutrition
L. H. Goddard, C. E.	Cooperative Experiments

ASSISTANTS.

William H. Kramer, *Bursar*	Administration
F. A. Welton, B. S.	Agronomy
C. G. Evans	Agronomy
Ralph E. Caldwell, B. S.	Animal Husbandry
Thomas F. Manns, M. S.	Botany
True Houser	Botany
W. F. Pate, B. S.	Chemistry
E. W. Gaither, B. S.	Chemistry
L. T. Bowser, B. S.	Chemistry
M. O. Bugby, B. S.	Cooperative Experiments
W. L. Elser, B. S.	Cooperative Experiments
W. M. Cook	Cooperative Experiments
Gail T. Abbott, A. B.	Cooperative Experiments
W. A. Lloyd	Cooperative Experiments
W. H Goodwin B. S.	Entomology
J. S. Houser, B. S.	Entomology
L. L. Scott	Entomology
Edmund Secrest, B. S.	Forestry
J. J. Crumley, Ph. D	Forestry
F. H. Ballou	Horticulture
Jos. H. Gourley, B. S.	Horticulture
R. C. Collison, M. S.	Nutrition
A. C. Whittier, B. S.	Nutrition
R. C. E. Wallace, B. S.	Soils

FOREMEN AND CLERKS.

William Holmes, *Farm Foreman*	Agronomy
Charles A. Patton, *Meteorological Observer*	Agronomy
Ora Flack, *Foreman of Orchards*	Horticulture
W. E. Bontrager, *Foreman of Grounds*	Horticulture
Chas. G. Laper, *Foreman of Greenhouses*	Horticulture
Anthony Russ, *Herdsman*	Animal Husbandry
Cary Welty, *Mechanic*	Administration
F. W. Glass, *Printer*	Administration
Faye Blayney, *Mailing Clerk*	Administration
Lemuel Harrold, *Clerk*	Administration
Mary M. Lee, *Stenographer*	Administration
E. C. Morr, *Stenographer*	Agronomy
Valeria Riley, *Stenographer*	Forestry
Z. McCammon, *Forestry Foreman* (*Stationed at Lancaster*)	Forestry

IN CHARGE OF TEST FARMS.

Edward Mohn, Supt. Northeastern Test-farm, Strongsville	Administration
Henry M. Wachter, Supt. Southwestern Test-farm, Germantown	Administration
Lewis Schultz, Supt. Southeastern Test-farm, Carpenter	Administration

The Bulletins of this Station are issued at irregular intervals. They are paged consecutively and an index is included with the Annual Report, which constitutes the final number of each yearly volume.

REPORT OF THE BOARD OF CONTROL.

To His Excellency, Geo. K. Nash, *Governor of Ohio:*

SIR:—The twenty-second Annual Report of the Ohio Agricultural Experiment Station, for the year ended June 30, 1903, is herewith respectfully submitted.

No changes occurred in the personnel of the board of control during the year, you having reappointed Hon. Friend Whittlesey, at the expiration of his term of office.

On the 22nd of October, 1902, the Agriculturist of the Station, Prof. J. Fremont Hickman, died from typhoid fever. Mr. Hickman became a member of the staff of the Station on the date of its reorganization under the Hatch Act, April 2, 1888, and had served it faithfully and efficiently for fourteen years and a half. The following resolution has been adopted unanimously by the board of control:

"As members of the Board of Control of the Ohio Agricultural Experiment Station we desire to record our feeling of great loss in the death of Prof. J. Fremont Hickman, Agriculturist of the Station. His ability in research work, his great service in helping to place the Ohio Station in its present rank, his unswerving fidelity to its interests and his wide reputation with the masses as a safe authority, guide and leader in agricultural thought and practice, all combine to give untold value to his services and fill us with feelings of great personal loss. His character was most attractive and we have been drawn closer to him in our admiration of the manly, christian spirit that has made his life lovable.

We extend our deepest sympathy to the family of Prof. Hickman and yet we ask them to join with us in expression of joy that so much of value to the world, and to us as individuals, has been given by the life of the one whose memory we desire to honor".

On December 12th, Mr. F. C. Whittier, the Station printer, died suddenly of heart failure, and on June 1st, Mr. John F. Hicks, who had on the Saturday before resigned his position as Assistant Botanist in order to enter upon private business, was murdered on the streets of Wooster, under circumstances altogether creditable to himself. Both gentlemen had served the Station faithfully and well.

The Station's equipment has been increased during the year by the installation of a printing outfit, with which the bulletins will hereafter be printed, and by the leasing and partial equipment of two additional test farms, one located near Germantown, Montgomery county, and the other at Carpenter, Meigs county. The sandy land test farm near Neapolis, Fulton county, was abandoned on the expiration of the lease held upon it, because of our inability to purchase the land at a fair valuation.

There has been a very great increase in the work of the Station in all its departments during the past ten years, and this is especially true of the Agricultural department. Not only are the problems of the farm which require solution increasing in number, but with the rapid progress which farmers are making in the science of their calling, under the guidance of the college of agriculture, the farmers' institute and the agricultural press, the demand is constantly growing for more work on the part of the Experiment Station, especially in those lines which deal with the production of crops and the management of live stock. For this reason the Board of Control have decided to limit the agricultural department of the Station to the lines of work usually grouped under the head of agronomy, namely: the management of land and crop production, and to ask for an appropriation with which to establish in addition a department of animal husbandry, to be placed in charge of a chief whose work shall be the study of the many problems relating to the live stock industry of the state; an industry which in our judgment lies at the very foundation of a successful and prosperous agriculture.

The leases on the test farm at Strongsville will expire in 1904. The object in view in the establishment of this test farm, nine years ago, was the study of a soil, typical of large areas in the northeastern part of the state, and differing materially from that on which the Station is located. The work thus far done has demonstrated two points beyond question: (1) the urgent need of systematic, scientific study of this type of soils, and (2) the inadequacy of a ten-year period for such study. We therefore have decided to request an appropriation with which to close the options on this land, which were fortunately taken on very favorable terms, and to continue the work now under way.

In our previous report we called attention to the fact that southern Ohio had as yet practically no representation in the Station's work. A careful study of the statistics of crop production shows that, while a satisfactory progress is being made in most of the counties in the middle and northwestern sections of the State, the agriculture of the hill counties is at a standstill, or is actually retrograding. Certainly no section of the State needs the help, which the Experiment Station is prepared to give, so urgently as do these southern counties. Past experience has abundantly demonstrated the fact that this work of research in agriculture, which was an almost untrodden field fifteen years ago, is one which must be continued indefinitely, and is one which, when conducted on business principles, will give returns immeasurably beyond its cost. We therefore recommend that steps be taken at once for the purchase of a tract of land in the hill region of the state, which shall be adapted to the Station's work, and to inaugurate thereon a careful study of the problems peculiar to that region.

One of the lines of agricultural industry to which it would seem that many of the hills of southern Ohio might be profitably devoted is the production of orchard fruits. It is true that there are innumerable worthless orchards scattered over this region now, but there are also a few orchards within it which are annually yielding a profit which would be considered quite satisfactory to the owners of the most fertile farms in the level portions of the State. We therefore believe that an investigation of orchard management on hillside lands is well worth the undertaking. Such an investigation should include not only a study of the methods which have brought success to practical orchardists, but also the planting and growth of orchards under the Station's full control, in order that the principles upon which successful orchard culture depends may be scientifically worked out and demonstrated for the benefit of all.

Another industry which should prosper in this region is the keeping of live stock. There is sufficient evidence to show that many hillsides, now barren or cultivated in grain crops at a loss, might be profitably devoted to the growth of pasture grasses, and the study of the conditions under which such grasses may be introduced and maintained must take rank as one of the most important which the Station can undertake. Such a study involves the keeping of animals, and the growth of such forage crops as are essential to their maintenance, and it is evidently a study which can only be effectually conducted under the conditions of topography, soil and climate which prevail in the region for the benefit of which it is instituted.

A third industry to which the more rugged lands of this region would seem to be especially adapted is that of forestry. The rapid increase in the price of lumber during recent years makes it evident that the time has come when the culture of species of forest trees, which grow rapidly and become valuable for special uses at an early age, may be undertaken with a reasonable prospect of financial profit. It is the province of the Experiment Station to lead the way in such enterprises; to point out the varieties of trees best adapted to certain soils and to indicate methods of management likely to produce the best results.

It may be well to repeat that the outlying test farms, which the Station has conducted during the past ten years, and the continuance of which we are recommending, are merely points at which may be studied problems of great local importance but which can by no possibility be transferred to the central Station. It is no part of our policy, present or prospective, to duplicate the costly equipment in buildings, laboratories and staff of scientists which is being gradually accumulated at the central Station; but we are learning, year by year, that this equipment can only partially and very incompletely serve its purpose until supplemented by other agencies of research, among the most important of which are facilities for studying the effect of differences in soil and climate upon the problems under investigation. Were there no local interests to serve, therefore, test farms located on the widely differing soils of the state and under its varying climatic conditions would still be absolutely essential to the successful prosecution of the Station's work.

The extension work of the Station has by no means been limited to that done at the test farms, however. From its first organization, and increasingly during recent years, very valuable assistance has been rendered by farmers and fruit growers over the state, who have placed their fields, orchards and vineyards at the disposal of the Station for special tests. It is hoped to largely extend this line of work, for no practicable multiplication of test farms can fully serve the present needs of the agriculture of the state. The work which can be successfully conducted on this co-öperative plan. however, is largely limited to what may be called demonstration work, as distinguished from research proper. The spraying of an orchard or vineyard, for instance, under conditions which had been previously worked out at the Station and found to be safe and effective, has repeatedly been an object lesson of great value to an entire community; but the Station cannot go into a private orchard and work out the methods upon which this successful practice is based, for such work involves many failures, reaching even to destruction of trees and vines, before the desired results are attained. Neither can scientific soil study be carried on by this method, for soil study requires many years' continuous work on the same land, at a large sacrifice on portions of it in unprofitable yields, before the controlling principles which must gı ide economic fertilizing can be demonstrated.

But the field for co-öperative work is nevertheless very large and is constantly increasing with the increasing understanding of our farmers, and one of the agencies through which such work is likely to be most successfully conducted in the future is the organization known as the Agricultural Student Union of Ohio. This organization, founded originally among students and ex-students of the College of Agriculture of the Ohio State University, but working in close affiliation with the Experiment Station as well as with the College of Agriculture, has aroused a wide interest in research work among the thinking farmers of the state. We believe that it may be made an agency of very great usefulness in extending the work of both University and Station.

O. E. BRADFUTE,
Secretary of the Boaɿd of Control.

REPORT OF THE BURSAR.

Mr. Alva Agee, *President of the Board of Control.*

Sir:—I respectfully submit herewith the financial report of this Station for the fiscal year ending June 30, 1903.

In Statements A, B, C and D, respectively, will be found a record of the receipts and expenditures from the various funds; Statement A being a statement of account with the annual appropriation received from the U. S. Treasury, and a copy of the report made to the Governor of the State, the Secretary of Agriculture and the Secretary of the U. S. Treasury; Statement B being a statement of account with the State Treasury; and Statement C showing the receipts from farm produce and other sources and the expenditures from this fund.

The three Statements, A, B and C, are combined in Statement D, which shows the total income and expenditures for the fiscal year.

STATEMENT A.

The Ohio Agricultural Experiment Station in Account with the United States Appropriation, 1902–1903.

Dr.

To receipts from the Treasurer of the United States, as per appropriation for the fiscal year ending June 30, 1903, as per act of Congress approved March 2, 1887..............$15,000.00

Cr.

By expenditures for:—

Salaries	$ 9,667.92	
Labor	2,867.38	
Postage and stationery	41.41	
Heat, light, water and power	299.23	
Seeds, plants and sundry supplies	948.73	
Fertilizers	381.92	
Feeding stuffs	245.34	
Tools, implements and machinery	305.69	
Furniture and fixtures	22.20	
Live stock	50.00	
Traveling expenses	102.25	
Contingent expenses	15.00	
Buildings and repairs	52.93	
		$15,000.00

We, the undersigned, duly appointed Auditors of the Corporation, do hereby certify that we have examined the books and accounts of the Ohio Agricultural Experiment Station for the fiscal year ending June 30, 1903; that we found the same well kept and classified as above, and that the receipts for the year from the Treasurer of the United States are shown to have been $15,000.00, and the corresponding disbursements $15,000.00; for all of which proper vouchers are on file and have been by us examined and found correct.

And we further certify that the expenditures have been solely for the purposes set forth in the act of Congress approved March 2, 1887.

{ SEAL OF INSTITUTION. }

Signed,

FRIEND WHITTLESEY.
O. E. BRADFUTE.
Auditors of Board of Control.

Attest: CHAS. E. THORNE, *Custodian.*

STATEMENT B.

OHIO AGRICULTURAL EXPERIMENT STATION IN ACCOUNT WITH THE STATE TREASURY.

Date of appropriation.	Appropriation for—	Total amount to Station's credit.	Total amount expended.	Balance in treasury June 30, 1903
1903	Expenses of the Board of Control......	$ 500.00		$ 500.00
	Bulletin illustration.........	400.00		400.00
	Special work in entomology, botany, horticulture and chemistry........	7,000.00		7,000.00
	Sub-Stations for field experiments ...	5,000.00	1,102.60	3,897.40
	General repairs, labor and supplies...	7,000.00	1,789.10	5,210.90
	Special work in animal industry......	1,500.00	973.83	526.17
	Library equipment and care..........	500.00	2.88	497.12
	General construction.................	3,000 00		3,000.00
	Totals for 1903....	$24,900.00	$ 3,868.41	$ 21,031.59
	Balance of appropriations for 1902 brought forward July 1, 1903......			
1902	Bulletin illustration..................	$ 400.00	$ 146.96	$ 253.04
	Special work in entomology, botany, horticulture and chemistry........	5,918.31	5,580.68	337.63
	Sub-Station for field experiments......	4,214.05	4,214.05	
	General repairs, labor and supplies...	6,942.38	6,942.38	
	Ivestigation of tuberculosis...........	3,359.19		3,359.19
	Special work in animal industry......	1,500.00	1,500.00	
	Library equipment and care..	250.00	250.00	
	Totals............	$ 47,483.93	$ 22,502.48	$ 24.981.45

STATEMENT C.

Ohio Agricultural Experiment Station in Account with the Produce Fund.

Dr.

To Receipts.

June 30, 1903.		
From sales of agricultural produce	$2,060.78	
" " dairy produce	766.76	
" " live stock	565 19	
" " horticultural produce	1,957.02	
" " botanical produce	8.40	
labor	73.80	
rent	591.57	
miscellaneous sales	333.21	
fees for testing dairy cattle (milk test)	383.05	
fees for chemical analysis	10.00	
Student Union	1.25	
Northeastern Sub-Station	119.20	
Northwestern Sub-Station	255.99	
Southeastern Sub-Station	19.75	
Total receipts for the year		$7,145.97
To balance brought forward July 1, 1902		1,069.82
Total		**$8,215.79**

Cr.

By Expenditures:—

June 30, 1903.		
For labor	$3,291.77	
postage and stationery	69.11	
freight and express	542.70	
heat, light, water and power	2.95	
seeds, plants and sundry supplies	531.32	
tools, implements and machinery	.95	
furniture and fixtures	79.93	
live stock	9.00	
traveling expenses	507.68	
contingent expenses	50.00	
buildings and repairs	215.81	
miscellaneous	232.98	
Total expenditures for the year		$5,534.20
By balance carried forward		2,681.59
Total		**$8.215.79**

STATEMENT D.

Total Receipts and Expenditures of the Ohio Agricultural Experiment Station for the Year Ending June 30, 1903.

Total Receipts:—

From United States Treasury	$15,000.00	
State Appropriations	24,900.00	
Miscellaneous receipts	7,145.97	
Total receipts for the year		$47,045.97
To balance brought forward July 1, 1902		23,653.75
Total		**$70,699.72**

Total Expenditures:—

For salaries of technical and office staff		$10,428.65	
foremen and skilled laborers	$6,179.65		
ordinary labor	6,519.19		
Total labor		12,698.84	
publications		286.56	
postage and stationery		432.18	
freight and express		739.23	
heat, light, water and power		779.26	
chemical supplies		119.76	
seeds, plants and sundry supplies		2,982.67	
fertilizers		439.65	
feeding stuffs		1,324.45	
library		265.17	
tools, implements and machinery		4,568.44	
furniture and fixtures		106.93	
scientific apparatus		25.30	
live stock		3,222.34	
traveling expenses		1,407.77	
contingent expenses		572.96	
buildings and repairs		2,403.54	
miscellaneous		232.98	
Total expenditures for the year			$43,036.68
By balance carried forward			27,663.04
Total			**$70,699.72**

Respectfully submitted,

W. H. Kramer, *Bursar.*

REPORT OF THE DIRECTOR.

Mr. Alva Agee, *President of the Board of Control.*

Sir:—The death, last October, of our loved and honored co-worker, Mr. J. Fremont Hickman, Agriculturist, was the first break to occur in the Station's administrative work since its organization in 1888. Having charge of the large business relations as well as of the research work of his department, his position had become of peculiar responsibility. Fortunately, his records were so carefully kept that very little of his work has been lost with him, while his successor, Mr. C. G. Williams, takes up the work of the department in full sympathy with his ideals, so that it will go on with the least possible interruption to its continuity.

THE WORK OF THE YEAR.

The published work of the Station for the year under review is comprised in the following bulletins:

Bulletin 136, pp. 1–24: By C. E. Thorne. The Hessian Fly in Ohio; a historical account of recorded attacks of this insect within the state, accompanied by statistical maps; a review of the statistics of rainfall and temperature in years of fly attack; experiments showing effect of fertilizers on the fly; experiments on dates of sowing wheat, and illustrated description of the Hessian fly.

Bulletin 137, pp. 25–38: By W. J. Green. Suggestions concerning Apple Culture. Including the site for an orchard; the selection of trees for planting; cultivation and cover crops; the grass mulch; spraying, and formulæ for spray mixtures.

Bulletin 138, pp. 39–52: By C. G. Williams. Experiments with Oats. Including comparison of varieties; preparation of seed bed; quantity and quality of seed; depth of seeding, and drilling vs. broadcasting.

Bulletin 139, pp. 53–66: By A. D. Selby. A Rosette Disease of the Potato, attributed to the sterile fungus *Rhizoctonia*. Including special characteristics of the disease; means of dissemination: methods of prevention, and literature list.

Bulletin 140, pp. 67–88: By C. G. Williams. The Corn Crop. Including selection of seed; description of varieties; hill planting vs. drilling; cultivation, and variety test.

Bulletin 141, pp. 89–110: By C. E. Thorne. The Maintenance of Fertility. Including field experiments with fertilizers on cereal crops; the effect of lime on clover, and the home mixing of fertilizers.

Bulletin 142, pp. 111–129: By A. D. Selby. Clover Seed. An investigation on the purity and vitality of clover and alfalfa seeds as found in the market.

Bulletin 143, pp. 131–156: By C. A. Patton. Meteorological summary, press bulletins and index. This bulletin is appended to the present report.

In addition to the work reported in these bulletins the following investigations have been begun or extended during the year:

1. Our field experiments in the use of fertilizers and manures have been extended to the test farm located near Germantown, Montgomery county, in the midst of the principal tobacco growing section of the state. One of the special objects in view here will be the study of the effect of various fertilizing materials upon a plant so different in its botanical relationships and in its uses from the crops hitherto under experiment as is tobacco. Another object will be to compare the effect of these various materials on a soil originating from limestones with the results which are being attained on the soils of sand rock origin which have hitherto been under investigation. The land selected here is upland clay, the original forest growth being chiefly beech and sugar maple. It has been prepared for its work by the laying of about seven miles of tile drains. Experiments with tobacco were begun in the spring of 1903, and a surprisingly large increase from the fertilizers and manure is shown in this first crop.

While investigations on tobacco production will occupy a leading place in the work of this test farm, it is expected that the work with cereals which is also to be conducted here will serve a not less important purpose. Hitherto the Station's investigations on the problems relating to the maintenance of fertility have been limited to soils derived chiefly, or altogether, from sandstones or argillaceous shales, and we have realized that such work could only be a very uncertain guide to the farmer located on the limestones which cover most of the western half of the state.

2. Our experiments in the culture of leguminous forage crops have been extended to include a comparison of varieties and cultural work at the test farms, and the use of fertilizers, lime, manure and soil inoculation at the Station, where 40 tenth-acre plots of alfalfa and 30 each of soy beans and cow peas are employed in testing the

use of phosphorus, alone and in combination with potassium and nitrogen, and of stable manure, these fertilizers and manure being cross-dressed on one series of plots with lime and on another with inoculated soil. Experiments are also being made in the combination of forage crops for soiling purposes, this forage crop work, as a whole, being preliminary to a more extended study of the problems of animal husbandry than we have heretofore undertaken.

3. Experiments have been commenced in the use of cover crops seeded in corn at its last cultivation, with the object of preventing waste of nitrates during the late fall and of retarding the washing and gullying of the fields during the winter and spring.

4. In co-öperation with the Bureau of Plant Industry, U. S. Department of Agriculture, the Station is undertaking experiments with clover seeds of different origin and with varieties of soy beans and cow peas.

5. Investigations have been inaugurated on the diseases of tobacco, and the study of peach-leaf curl, grape rot, bitter rot of the apple, potato rosette and other plant diseases is being continued. Systematic experiments have been commenced, looking towards the improvement of varieties of wheat and corn by selection and cross fertilization, regard being had not only to productiveness but to chemical composition.

6. A number of proprietary stock foods have been examined, and have been found to be composed chiefly of bran and similar feeds, with a small percentage of medicinal agents. Nux vomica, in small quantities, was found in a few samples, which may account for the sudden death of animals after feeding on such feeds, which have occasionally been reported to us. A few samples of bran have been sent to us for examination. In one case the bran was found to be so largely made up of oat chaff, chess and mill sweepings as to have its value very materially reduced. The urgency with which the various condimental stock foods, distillery and brewery wastes and cereal and starch factory by-products are being pushed upon the market is making it necessary that Ohio should follow the example of numerous other states in providing for official inspection of commercial feeding stuffs. We have already reason to believe that feeds which would doubtfully pass inspection in neighboring states are being sold in Ohio. It would seem that this work might well be associated with the inspection of fertilizers.

7. Investigations have been instituted to determine whether the ratio of lime to magnesia, as found in certain Ohio soils, has an influence on their physical properties and productiveness.

8. An attempt is being made to learn the cause of soil acidity and its relation to failure of the clover crop.

9. In co-öperation with the Bureau of chemistry, U. S. Department of Agriculture, investigations are being conducted on the availability of plant food in the soil.

10. The work of this season has determined in a most conclusive manner the efficiency of the California lime, sulphur and salt wash for the control of the San José scale. Not only has it kept the scale under control more effectively and with less injury to the tree than any other remedy yet tried, but it has proved to be a most efficient preventative of the peach-leaf curl, thus acting both as insecticide and fungicide. As the northern section of the state, in which these experiments are conducted, suffered from excessive rainfall during the period when they were in progress, it would seem that the claim that this remedy is only adapted to dry climates is effectually disposed of.

11. In the fall of 1902 the Station purchased a carload of grade Aberdeen-Angus calves, bred in the "Pan Handle" of Texas, and these are now being fed for the purpose of securing data concerning the practicability of bringing into Ohio and feeding off here the cattle of the western ranges.

Respectfully submitted,

CHAS. E. THORNE, *Director.*

APPENDIX.

Bulletins

OF THE

Ohio Agricultural Experiment Station

1902-1903

CONTENTS.

BULLETIN

OF THE

Ohio Agricultural Experiment Station

NUMBER 143. JUNE, 1903.

METEOROLOGICAL SUMMARY—PRESS BULLETINS—INDEX.

METEOROLOGICAL SUMMARY FOR 1902.

BY C. A. PATTON.

EXPLANATION OF TABLES.

The following tables contain statistics of temperature, rainfall, etc., for the year, and are compiled from data obtained by daily observations. "T" stands for "trace"—less than .01 inch of rainfall. Temperature is given in degrees Fahrenheit.

Table 1 shows the daily rainfall at the Station during the year in inches and hundredths.

Table II shows the daily mean temperature at the Station for each day of 1902 and the monthly mean temperature, with the fifteen years' average.

Table III gives a comparison of the monthly mean temperature and rainfall for the Station, with the fifteen years' average for the same.

Table IV gives a comparison of the monthly mean temperature and rainfall for the State, with the fifteen years' average for the same.

Table V gives the monthly mean temperature and rainfall for the Station and State for 1902, with the fifteen years' average for the same.

Table VI contains the mean temperature, the highest and the lowest temperatures, with the range of temperature for each month; the number of clear, fair and cloudy days; the rainfall, snowfall and prevailing direction of wind at the Station, for 1902.

Table VII contains the principal points of interest on temperature, state of weather and rainfall for the Station during the year and a grand summary for fifteen years

Table VIII contains the principal points of interest on temperature, state of weather and rainfall for the State during the year and a grand summary for twenty years.

The statistics for the State and for this Station previous to 1893 are compiled from the publications of the Ohio Meteorological Bureau and State Weather Service, the fifteen years' average being computed from the observations of the Wooster Station of the Ohio Meteorological Bureau, now located on the grounds of the Experiment Station, one mile south of Wooster.

NOTES ON THE WEATHER AT THE STATION, 1902—SUMMARY BY MONTHS.

JANUARY.

The mean temperature for January was 26.3°, which is 1° below the Station average for January. The highest, 47°, occurred on the 2nd and 9th; the lowest, 2°, on the 28th. Clear weather prevailed. Rain or snow fell on eight days. The total precipitation was 1.63 inch, which is 2.37 inches below the Station average for January. The prevailing wind was southwest.

FEBRUARY.

The mean temperature for February was 21.4°, which is 5.4° below the station average for February. The highest, 59°, occurred on the 28th; the lowest, —9°, on the 5th. Cloudy weather prevailed. Rain or snow fell on seven days. The total precipitation was 0.83 inch, which is 2.03 inches below the Station average for February. The prevailing wind was northwest.

MARCH.

The mean temperature for March was 41.2°, which is 5.2° above the Station average for March. The highest, 69°, occurred on the 12th and 26th; the lowest, 9°, on the 18th. Clear weather prevailed. Rain or snow fell on 12 days. The total precipitation was 2.96 inches, which is 0.23 inch below the Station average for March The prevailing wind was southwest

APRIL.

The mean temperature for April was 46.2°, which is 2.2° below the Station average for April. The highest, 83°, ocurred on the 22nd; the lowest, 24°, on the 5th. Clear weather prevailed. Rain or snow fell on 11 days. The total precipitation was 1.46 inch, which s .93 inch below the Station average for April. The prevailing. wind was west.

MAY.

The mean temperature for May was 61.2°, which is 3.1° above the Station average for May. The highest, 97°, occurred on the 4th; the lowest, 29°, on the 10th. Clear weather prevailed. Rain ell on 11 days. The total precipitation was 2.57 inches, which is 1.52 inch below the Station average for May. The prevailing wind was north and southwest.

JUNE.

The mean temperature for June was 65.6°, which is 2.4° below the Station average for June. The highest, 89°, occurred on the 12th and 15th; the lowest, 39°, on the 9th. Clear weather prevailed. Rain fell on 16 days. The total precipitation was 5.55 inches, which is 1.39 inch above the Station average for June. The prevailing wind was southwest.

JULY.

The mean temperature for July was 73°, which is 1.7° above the Station average for July. The highest, 93°, occurred on the 17th; the lowest, 46°, on the 11th. Clear weather prevailed. Rain fell on fifteen days. The total precipitation was 5.26 inches, which s 1.02 inch above the Station average for July. The prevailing wind was north and southwest.

AUGUST.

The mean temperature for August was 66.4°, which is 2.7° be-w the Station average for August. The highest, 88°, occurred on the 3rd and 31st; the lowest, 40°, on the 17th. Clear weather. prevailed. Rain fell on ten days. The total precipitation was 1.87 inch, which is 1.02 inch below the Station average for August. The prevailing wind was northeast.

SEPTEMBER.

The mean temperature for September was 62.0, which is 0.7° below the Station average for September. The highest, 85°, occurred on the 8th and 23rd; the lowest, 32°, on the 14th and 15th. Clear weather prevailed. Rain fell on ten days. The total precipitation was 3.49 inches, which is .19 inch above the Station average for September. The prevailing wind was southeast.

OCTOBER.

The mean temperature for October was 53.9°, which was 3.2°, above the Station average for October. The highest temperature, 77°, occurred on the 26th; the lowest, 27°, on the 31st. Clear weather prevailed. Rain fell on ten days. The total precipitation was 1.52 inch, which is .82 inch below the Station average for September. The prevailing wind was southwest.

NOVEMBER.

The mean temperature for November was 47.3°, which is 7.1° above the Station average for November. The highest temperature, 72°, occurred on the 2nd; the lowest, 24°, on the 28th. Cloudy weather prevailed. Rain or snow fell on eleven days. The total precipitation was 2.62 inches, which is .70 inch less than the Station average for November. The prevailing wind was southwest.

DECEMBER.

The mean temperature for December was 28.7°, which is 2.5° below the Station average for December. The highest temperature, 60°, occurred on the 2nd; the lowest, 5°, on the 31st. Cloudy weather prevailed. Rain or snow fell on nineteen days. The total precipitation was 4.07 inches, which is 1.51 inch above the Station average for December. The prevailing wind was southwest.

METEOROLOGY—TABLE I.—RAINFALL.

DAILY RAINFALL AND MELTED SNOW FOR 1902 AT EXPERIMENT STATION.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Date.
1	....	......	.14	.01	.....	....	.02	....	.56	.03	.....	......	1
2	.....	.40	......	......	.41	T	....	......	.....	......	......	.45	2
3	.02	....	T	.01	......	T	.23	.07	....	.08	T	.19	3
4	T	.02	......	......	.....	......	.20	.....	.12	.34	......	.01	4
5	......	....	.....	.....	.51	......	......	.06	.....	.09	.13	.04	5
6	......	T	....	.39	......	.....	.....	.43	T	.08	.16	......	6
7	......	T	......	......	.03	.22	.04	.05	......	.02	......	T	7
8	......	......	.50	.51	......	.95	.20	......	......	......	......	.05	8
9	.....	T	.06	.18	.....	.....	.53	......	.58	.....	......	......	9
10	.. ..	T	......	......	T	.....	.68	.05	.....	......	.14	T	10
11	.05	T	01	.03	.....	.25	.....	T	.....	.06	.30	.38	11
12	.05	.07	27	T	....	......	.....	......	14	T	......	T	12
13	T	..	04	......	.30	06	......	.01	.48	.70	....	.63	13
14	...	T	....	.....	.....	.20	.....	.....	....	......	.....	......	14
15	...	....	.05	.....	T	32	.....	T	. ..	....	......	.57	15
16	.02	.	.22	.....	. .	.94	....	....	....	.....	......	.30	16
17	.....	.05	T	.....	......	......	.....	.....	......	......	1.11	.03	17
18	.....	T	T	.....	.....	......	1.45	......	....	......	.10	......	18
19	.....	T	......	.....	.....	.02	.23	.03	T	.....	......	.02	19
20	....	T	......	.....	.26	T	.47	.61	......	.....	.....	.05	20
21	.40	05	......	T	.....	.26	.11	.....	....	.....	......	.31	21
22	T	......	.....	.....	.17	T	.02	......	......	.....	.06	.07	22
23	......	......	......	....	.88	.03	......	.....	......	......	......	......	23
24	.....	......	......	.03	.16	.27	......	......	.74	.....	.03	.07	24
25	...	......	......	.....	.22	.67	......	....	.17	......	.....	.40	25
26	.05	......	......	.12	......	.03	......	....	.09	......	.43	.30	26
27	.02	.02	T	.....	.12	......	.06	......	......	.10	.14	.10	27
28	......	.22	.86	.02	T	.09	.80	.....	.51	T	......	......	28
29	.02	......	.25	.14	.11	1.05	.22	......	T	T	.02	.10	29
30	......	......	.16	.02	......	.19	......	.55	.10	.02	......	......	30
31	......	......	.43	......	......	......	......	.01	.....	......	......	......	31
Totals	.63	.83	2.99	1.46	2.57	5.55	5.26	1.87	3.49	1.52	2.62	4.07	
Averages	.02	.03	.10	.05	.08	.18	.17	.06	.12	.05	.09	.13	

METEOROLOGY—TABLE II.—TEMPERATURE.

MEAN TEMPERATURE AT THE STATION FOR EACH DAY OF 1902.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November	December.	Date.
1..................	22.5	21.5	46.5	32.0	53.0	74.0	64.5	74.0	74.5	57.5	49 5	28.5	...**1**
2..................	35.5	35.5	36.0	31.5	63.5	77.5	67.5	71.5	65.5	50.5	55.0	46.5	....**2**
3..................	21.0	3.5	27.0	39.5	65.0	73.0	77.0	75.5	62.5	55.0	56.5	44.5	....**3**
4..................	17.5	7.0	28.0	32.5	74.5	68.5	79.5	69.0	62.0	51.5	48.0	34.0	....**4**
5..................	21.5	0.5	27.5	39.0	67.0	61.5	79.0	65.5	54.0	59.5	52.5	29.5	....**5**
6..................	32.0	17.5	34.0	42.0	66.5	68.0	79.5	68.0	60.0	57.5	54.0	29.0	....**6**
7..................	33.5	17.0	38.0	36 0	64.0	73.0	85.0	60.0	65.0	53.5	46.5	29.0	....**7**
8..................	37.5	11.0	38.5	31.0	54.0	64.0	79.0	66.5	65.0	53.0	42.5	21.0	....**8**
9..................	34.0	13.0	38.5	37.5	52.5	55.5	79.5	72.0	62.0	54.0	44.5	15.0	....**9**
10..................	35.5	17.0	42.5	49.0	38.5	69.0	71 0	71.0	55.5	52.0	52.0	28.0	....**10**
11..................	32.0	17.0	56.5	49.5	49.0	68.0	61.0	68.0	62.0	58.0	51.5	35.0	....**11**
12..................	18.5	19.0	61.0	44.5	59.0	73.5	63.5	61.0	63.0	60.0	63.5	28.5	....**12**
13..................	17.0	15.5	46.0	39.5	62.0	74.0	68.5	60.5	50.0	58.0	59.5	26.0	....**13**
14..................	23.5	16.5	37.5	37.0	57.5	75.0	77.0	71 0	47.5	49.5	56.5	23.0	....**14**
15..................	33.5	10.5	45.0	39.0	48.0	75.5	74.0	59.5	50.0	45.0	54.5	28.0	....**15**
16..................	23.5	15.0	53.0	42.5	53 0	70.0	69.5	61.5	57.0	50.5	46.5	36.0	....**16**
17..................	19.5	20.5	33.0	42.5	57.5	64.0	79.0	57.5	61.0	49.5	48.0	29.0	....**17**
18..................	35.0	16.0	23.5	47.5	68.0	62.5	76.0	64.5	64.0	58.0	48.0	33.0	....**18**
19..................	24.5	9.0	24.5	53.5	76.0	68.5	76.0	71.0	67.0	62.0	49.0	38.5	....**19**
20..................	26.0	10.5	33 0	52.0	72.0	63.0	73.5	70.0	68.0	49.0	48.0	41.0	....**20**
21..................	30.5	25.0	39.5	56.0	70.0	61.5	63.5	71.5	68.5	51.0	52.0	47.5	....**21**
22..................	26.0	30.0	43.0	72.5	74.5	58.0	67.5	62.0	67.0	49.0	47.5	36.5	....**22**
23..................	24.5	31.0	45.0	61.0	74.0	53.0	67.0	57.5	68.5	59.0	40.0	29.0	....**23**
24..................	31.0	37.5	43.5	47.0	71.5	56.0	68.0	59.0	68.5	63.5	44.0	28.0	....**24**
25..................	27.0	38.5	42.5	52.0	71.0	59.5	73.0	57.5	68.5	59.5	41.5	20.0	....**25**
26..................	33.5	48.0	49.0	61.5	63.5	57.0	75.0	63.5	69.0	64.0	39.0	16.5	....**26**
27..................	27.5	44.0	57.5	52.0	49.5	58.5	76.5	66.5	68.5	59.0	32.5	11.5	....**27**
28..................	15.5	51.0	56.5	51.0	46.0	58.5	75.0	69.0	62.0	50.0	31.0	21.0	....**28**
29..................	12.5	......	51.0	56.5	53.0	62.5	72.0	70.0	65.0	43.5	34.0	25.0	....**29**
30..................	20.5	......	46.0	59.5	65.5	68.0	73.0	72.0	60.5	45.5	33.0	19.5	....**30**
31..................	25.0	......	35.5	......	58.5	......	73.0	74.0	......	45.0	......	12.0	....**31**
Monthly mean...	26.3	21.4	41.2	46.2	61.2	65.6	73.0	66.4	62.7	53.9	47.3	28.7	
15-year average	**27.3**	**26.8**	**36.0**	**48.4**	**58.1**	**68.0**	**71.3**	**69.1**	**63.4**	**50.7**	**40.2**	**31.2**	

METEOROLOGY—TABLE III.

MONTHLY MEAN TEMPERATURE AND RAINFALL FOR FIFTEEN YEARS AT WOOSTER.

Temperature in degrees Fahrenheit.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.	Date.
1888............	23.0	28.4	31.7	46.3	57.7	68.9	70.1	67.8	57.1	44.9	40.7	31.4	47.3	1888
1889............	31.1	22.9	38.7	47.1	57.8	64.5	70.0	66.0	60.8	45.3	39.3	40.7	48.6	1889
1890............	36.0	36.6	30.9	48.4	56.0	69.8	70.5	65.8	59.6	50.0	41.3	28.8	49.5	1890
1891............	30.0	34.0	32.0	49.0	52.0	68.0	68.0	71.0	68.0	49.0	38.0	37.0	49.6	1891
1892............	22 0	33.0	33.0	47.0	57.0	70.0	70.0	69.0	61.0	49.0	38.0	28.0	48.0	1892
1893............	18.0	28 0	38.0	50.1	57.6	69.3	72.0	67.9	63.2	52.3	37.7	30.9	48.7	1893
1894	32 8	26 7	43 5	50.5	57.5	67.9	71.4	69.2	66.1	52.3	36.5	32.9	50.6	1894
1895.....	21.9	17.9	32.4	49.5	59.4	69.9	68.6	70.9	66.5	44.2	40.4	32.8	47.8	1895
1896............	27.9	29.2	29.8	54.6	64.5	65.6	70.2	68.5	60.6	45.8	44.4	30.6	49.3	1896
1897...........	24.0	30.0	39.3	47.2	53.4	64.3	73.2	67.0	66.7	55.9	40.7	31.8	49.4	1897
1898............	31.6	27.4	43.3	45.3	58.2	68.7	74.5	71.1	66.2	52.6	38.4	27.9	50.4	1898
1899............	26 6	21.3	35.0	52.1	60.0	69.4	70.0	71.0	61.6	55.0	43.2	29.0	49.5	1899
1900...........	30.2	25.0	31.8	47.8	61.5	68.5	72.6	74.0	67.1	58.9	40.6	30.7	50.7	1900
1901............	28.3	20.0	39.1	45.2	57.9	69.1	75.9	71.6	63.3	51.7	36.6	26.1	48.7	1901
1902............	26.3	21.4	41.2	46 2	61.2	65.6	73.0	66.4	62.7	53.9	47.3	28.7	49.5	1902
Averages..	**27.3**	**26.8**	**36.0**	**48.4**	**58.1**	**68.0**	**71.3**	**69.1**	**63.4**	**50.7**	**40.2**	**31.2**	**49.2**	

Rainfall—Inches.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.	Date.
1888............	3.52	2.43	3.34	2.48	3.82	2.31	4.54	4.35	1.92	3.18	4.95	1.39	3.18	1888
1889............	4.33	2.42	2.13	1.58	2.97	4.86	6.73	1.98	4.05	1.36	3.53	3.93	3.32	1889
1890............	4.71	6.20	4.37	3.10	6.01	5.57	2.67	4.66	5.12	7.45	2.61	1.74	4.51	1890
1891...........	2.74	4.83	3.71	1.66	2.24	7.13	3.28	1.85	0.94	1.33	5.73	2.92	3.20	1891
1892............	2 67	2.67	3.38	2.44	7.69	7.89	4.73	2.69	3.20	0.37	2.06	1.74	3.46	1892
1893...........	4.01	6.33	1.89	5.66	6.28	2.51	1.38	1.53	1.85	5.18	2.49	1.54	3.38	1893
1894............	2.19	3.37	2.36	1.74	4.41	2.23	1.38	0.76	4.07	2.53	2.41	3.15	2.55	1894
1895............	3.92	1.00	1.98	1.69	1.38	4.20	2.19	2.30	3.92	1.15	4.21	3.51	2.62	1895
1896............	1.73	2.27	3.67	3.34	3.41	3.98	8.05	1.96	5.16	0.71	1.78	2.41	3.21	1896
1897...........	2.82	2.64	2.81	2.75	4.97	2.98	3.89	3.86	0.29	0.89	5.76	2.50	3.01	1897
1898............	4.10	2.27	6.44	2.56	4.60	2.70	6.79	5.53	2.15	4.28	4.14	2.29	3.99	1898
1899............	3.29	1.64	3.95	1.28	4.42	1.95	3.73	0.53	5.56	2.21	1.59	2.78	2.74	1899
1900............	2.78	2.74	2.25	1.70	2.23	3.71	5.65	5.97	2.19	2.10	4.30	0.99	3.05	1900
1901............	1.58	1.20	3.09	2.46	4.32	4.82	3.32	3.58	5.64	0.81	1.62	3.47	2.99	1901
1902............	0.63	0.83	2.99	1.46	2.57	5.55	5.26	1.87	3.49	1.52	2.62	4.07	2.74	1902
Averages..	**3.00**	**2.86**	**3.22**	**2.39**	**4.09**	**4.16**	**4.24**	**2.89**	**3.30**	**2.34**	**3.32**	**2.56**	**3.20**	

METEOROLOGY—TABLE IV.

MONTHLY MEAN TEMPERATURE AND RAINFALL FOR FIFTEEN YEARS FOR THE STATE.

Tιmpeɪature in degrees Fahrenheit.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.	Date.
1888.......... .	24 3	30 5	34 2	49.2	59.1	70.4	72.1	70 4	60 3	47 9	42.9	33.3	49 5	1888
1889............	33 3	25.8	40.2	49.9	60.2	66.7	72.5	69.1	62.9	47.9	41.0	43.8	51.1	1889
1890............	38 8	39.4	34.5	51.3	59.2	73.3	73.1	68.8	62.1	52.7	43.9	31.2	52.3	1890
1891............	33.0	36.0	35.0	52.0	58.0	71.0	69.0	70.0	67.0	51.0	40.0	39.0	51.7	1891
1892............	24.0	35.0	35.0	49.0	59.0	73.0	73.0	71.0	64.0	52.0	38.0	29.0	50.1	1892
1893.....	18.0	29.0	38.0	50.2	58.3	70.6	74.5	70.7	65.2	53.7	39.3	32.7	51.6	1893
1894............	37.7	28.9	45.1	50.6	60.0	71.3	74.3	71.2	67.8	53.9	37.5	33.9	52.3	1894
1895............	23.4	19.6	35.5	51.7	61.1	70.2	71.6	73.5	69.0	46.9	41.3	33.9	49.9	1895
1896............	29.4	30.5	32.4	56.7	67.9	69.5	73.2	71.8	62.7	49.0	45.1	32.9	51.7	1896
1897............	25.5	32.4	41.5	49 3	46.3	68.1	75.5	69.4	66.9	58.1	42.2	32.8	50.6	1897
1898............	32.4	30.0	45.0	47 2	61.0	71.9	76.0	73.5	67.8	53.1	38.8	28.8	52.1	1898
1899............	27.8	21.6	36.9	53 3	63.3	71.5	74.1	73.7	64.1	57.4	43.9	30.2	51.5	1899
1900............	31.1	26.0	32.9	50.1	62.9	69.8	74.1	76.3	69.3	60.5	41.6	31.6	52 3	1900
1901............	29.2	21.1	39.5	46 [illegible]	59.0	70.9	78.1	73.1	64.8	53.8	37.7	27.9	50.2	1901
1902............	27.3	22.3	41.9	48 2	62.6	66.9	74.0	67.4	63 6	54.6	48.5	29.4	50 5	1902
A erages..	**29.0**	**28.5**	**37.8**	**50.3**	**59.9**	**70.3**	**73.7**	**71.3**	**65.2**	**52.8**	**41.4**	**32.7**	**51.1**	

Rainfall—Inches.

1888............	3.65	1.74	3.55	1.99	3.77	3.41	4.40	5.16	2.27	3.98	4 25	1.47	3.30	1888
1889............	3.13	1.35	1.50	1.79	3.71	4.13	4.25	1.50	3.62	1.78	4.02	2.81	2.79	1889
1890............	4.94	5.25	5.29	3.15	5.52	4.50	1.99	4.70	5.56	4.27	2.53	2.37	4.17	1890
1891............	2.82	4.91	4.19	2.13	2.20	4.82	3.82	3.07	1.50	1.76	5.00	2.39	3.21	1891
1892............	2.05	3.27	2.16	2.63	4.63	6.73	3.13	6.15	1.27	0.67	2.62	1.85	3.09	1892
1893............	2.56	5.13	2.09	6.37	4.97	3.34	2.49	2.17	1.57	4.24	2.09	2.61	3.30	1893
1894............	2.14	2.79	2.16	2.31	4.00	2.65	1.56	1.67	3.31	2.01	2.17	2.98	2.47	1894
1895............	4.00	0.69	1.59	2.11	1.80	2.44	2.00	2.96	1.66	1.22	4.11	3.85	2.37	1895
1896............	1.67	2.25	3.34	2.78	2.67	4.81	8.11	3.38	5.13	1.20	2.63	1.65	3.29	1896
1897............	1.93	3.64	5.17	3.27	3.93	2.85	4.65	2.72	0.78	0.64	6.62	2.39	3.21	1897

METEOROLOGY—TABLE V.

MEAN TEMPERATURE AND RAINFALL FOR THE STATION AND STATE FOR 1902 AND FOR FIFTEEN YEARS.

Temperature in degrees Fahrenheit. *Rainfall—Inches.*

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
Mean temperature at the Station, 1902	26.3	21.4	41.2	46.2	61.2	65.6	73.0	66.4	62.7	53.9	47.3	28.7	49.5
Fifteen years average temperature at the Station	27.3	26.8	36.0	48.4	58.1	68.0	71.3	69.1	63.4	50.7	40.2	31.2	49.2
Mean temperature for the State, 1902	27.3	22.3	41.9	48.2	62.6	66.9	74.0	67.4	63.6	54.6	48.5	29.4	50.5
Fifteen years average temperature for the State	29.0	28.5	37.[illegible]	50.3	59.9	70.3	73.7	71.3	65.2	52.8	41.4	32.7	51.1
Rainfall at the Station, 1902	0.63	0.83	2.99	1.46	2.57	5.55	5.26	1.87	3.49	1.52	2.62	4.07	2.74
Fifteen years average rainfall at the Station	3.00	2.86	3.22	2.39	4.09	4.16	4.24	2.89	3.30	2.34	3.32	2.56	3.20
Rainfall for the State, 1902	1.42	0.88	2.76	2.21	3.09	7.48	4.69	1.67	4.55	2.28	2.60	3.95	3.13
Fifteen years average rainfall for the State	2.84	2.74	3.31	2.67	3.67	4.02	3.77	3.23	2.74	2.17	3.28	2.61	3.09

METEOROLOGY—TABLE VI.

SUMMARY BY MONTHS FOR 1902.

	Temperature.											Number of days.				Monthly rainfall.	Average daily rainfall.	Monthly snowfall.	Prevailing wind.
	Mean.	Highest.	Date.	Lowest.	Date.	Range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Clear.	Fair.	Cloudy.	Rain fell .01 or more.				
At the Station:—																			
January	26.3	47	*2	2	28	45	16.3	33	27	4	22	12	7	12	8	0.63	.02	7.00	S. W.
February	21.4	59	28	—9	5	68	17.3	37	2	5	13	8	3	17	7	0.83	.03	6 00	N. W.
March	41.2	69	*12	9	18	60	20.2	40	26	7	28	15	2	14	12	2.99	.10	1 00	S. W.
April	46.2	83	22	24	5	59	20.9	36	24	4	1	13	4	13	11	1.46	.05	4 00	W.
May	61.2	97	4	29	10	68	27.3	45	4	10	25	28	0	3	11	2.57	.08	......	N.S.W.
June	65.6	89	*12	39	9	50	24.2	36	17	9	28	19	4	7	16	5.55	.18	......	S. W.
July	73.0	93	17	46	11	47	23.7	31	*16	11	21	19	6	6	15	5.26	.17	......	N.S.W.
August	66.4	88	*3	40	17	48	23.8	37	18	12	14	20	11	0	10	1.87	.06	......	N. E.
September	62.7	85	*8	32	*14	53	24.7	40	8	9	30	18	4	8	10	3.49	.12	......	S. E.
October	53.9	77	26	27	31	50	24.5	40	*10	7	4	16	4	11	10	1.52	.05	T	S. W.
November	47.3	72	2	24	28	48	19.1	39	20	6	18	12	0	18	11	2.65	.09	1 00	S. W.
December	28.7	60	2	—5	31	65	14 1	34	31	7	5	3	4	24	19	4.07	.13	12.00	S. W.
Sums and averages	**49.5**	**77**	.....	**22**	......	**55**	**21.3**	**37**	......	**8**	......	**183**	**49**	**133**	**140**	**2.74**	**.09**	**31.00**	S. W.
For the State:—																			
January	27.3	63	9	—11	14	74	......	42	14	......	......	10	8	13	7	1.42	.05	......	N. W.
February	22.3	66	28	—17	14	83	......	48	20	......	......	8	8	12	7	0.88	.03	......	W.
March	41.9	82	11	—4	6	86	......	47	25	......	......	9	8	14	10	2.76	.09	......	S. W.
April	48.2	90	22	17	5	73	......	48	25	......	......	10	9	11	8	2.21	.07	.....	W.
May	62.6	98	21	24	10	74	......	56	4	......	......	14	11	6	9	3.09	.10	.....	S. W.
June	66.9	98	*15	33	9	65	......	47	10	......	......	11	12	7	13	7.48	.25	......	S W.
July	74.0	100	8	43	11	57	......	50	12	......	......	16	11	4	11	4.69	.15	......	S. W.
August	67.4	97	*3	37	25	60	......	45	25	......	......	16	11	4	6	1.67	.05	......	S. W.
September	63.6	94	23	24	15	70	......	49	*8	......	......	13	7	10	11	4.55	.15	......	S. W.
October	54.6	88	23	21	30	67	......	50	22	......	......	14	9	8	8	2.28	.07	......	S. W.
November	48.5	87	11	17	29	70	......	47	1	......	......	10	7	13	10	2 60	.08	......	S W.
December	29.4	63	*3	—11	31	74	......	43	31	......	......	5	5	21	14	3.95	.12	. ....	S. W.
Sums and averages	**50.6**	**77**	.....	**14**	......	**71**	......	**48**	......	......	......	**136**	**106**	**123**	**114**	**3.13**	**.10**	.....	S. W.

On other dates also.

METEOROLOGY—TABLE VII.

SUMMARY BY YEARS AND GRAND SUMMARY FOR FIFTEEN YEARS.

	1888	1889	1890	1891	1892	1893	1894	1895
At....................................	Wooster.	Wooster.	Wooster.	Wooster.	Wooster.	Experiment Station.	Experiment Station.	Experiment Station.
Mean temperature	47.3°	48 6°	49.5°	49.6°	48.°	48.7°	50.6°	47.8°
Highest temperature.......................	....	91.5° *1	94.5° Aug. 3	99.0° Aug. 8	98.0° July 25	95.0° *5	98.0° July 19	98.° June 4
Lowest temperature.........................	—5° Feb. 9	—5° *2	1° March 7	0.° March 1	—20° Jan. 20	—9.° Jan. 11	—7.° Dec. 28	—6.° *8
Range of temperature.......................	....	96.5°	93.5°	99.0°	118.°	104.°	105.°	104.°
Mean daily range of temperature...........	....	18.7°	18.9°	21°	19.°	20.2°	22.9°	21.8°
Greatest daily range of temperature........	....	42° April 23	41° Jan. 13	42.° Sept. 23	46.° July 7	45.° Aug. 9	45.° July 31	55 ° Oct. 6
Least daily range of temperature...........	....	2° Jan. 6	4.5° *3	4.° Feb. 8	4.° *4	3.° *6	4.° *7	1.° Nov. 27
Number of clear days......................	....	125	109	116	116	96	127	125
Number of fair days........................	....	103	119	110	123	164	154	117
Number of cloudy days.....................	....	137	137	125	98	105	84	123
Number of days rain fell....................	....	119	149	119	119	129	130	102
Total rainfall...............................	38.23 inches	39.87 inches	54.21 inches	38.36 inches	41.46 inches	40.61 inches	30.60 inches	31 45 inches
Greatest monthly rainfall..................	4.54 inches	6.73 in.—July	7 45 in.—Oct.	4.26 in.—June	7 89 in.—June	6.33 in.—Feb.	4.41 in.—May	4.21 in.—Nov.
Least monthly rainfall......................	1.39 inches	1 36 in.—Oct.	1.74 in.—Dec.	1.95 in.—April	1.37 in.—Oct.	1.38 in.—July	0.76 in.—Aug.	1.00 in.—Feb.
Prevailing direction of wind................	S,......	S..............	S.............	S.............	S. W.........	S. W.........	S. W.........	W.............

*1 July 10, Sept. 1. *2 Feb. 23 and 24. *3 Jan. 8 and Sept. 10. *4 March 5, Nov. 1, 3, 25, Dec. 1 and 18. *5 July 7, 25 and Sept. 7. *6 Jan. 24, Feb. 11, and May 26. *7 Dec. 1 and 23. *8 Jan. 12, 13 and Feb 5.

METEOROLOGY—TABLE VII—Concluded.

SUMMARY BY YEARS AND GRAND SUMMARY FOR FIFTEEN YEARS AT WOOSTER.

	1896	1897	1898	1899	1900	1901	1902	Summary for fifteen years.
At	Experiment Station.	Experiment Station.	Experiment Station.	Experiment Station.	Experiment Station.	Experiment Station.	Experiment Station.	
Mean temperature	49.6°	49.4°	50.4°	49.5°	50.7°	48.7°	49.5°	49.2°
Highest temperature	93.° Aug. 9	96.° *10	96.° July 3	95.° Aug. 20	95.° July 4	95.° July *12	97.° May 4	99.° Aug. 8, 1891
Lowest temperature	—6.° Feb. 19	—18.° Jan. 26	—9.° Feb. 2	—21.° Feb. 10	—10.° Feb. 27	—11. Dec. 21	—9.° Feb. 5	—21.° Feb. 10, 1899
Range of temperature	99°	114.°	105.°	116.°	105.°	106.°	106.°	120.°
Mean daily range of temperature	19°	21.5°	20.3°	22.9°	20.6°	20.1°	21.3°	20.6°
Greatest daily range of temperature	43.° May 8	49.° Oct. 5	50.° Nov. 14	52.° Oct. 24	43.° May 6	43.° April 30	45.° May 4	55.° Oct. 6, 1895
Least daily range of temperature	3.° *9	0.° Feb. 6	5.° *11	3° Feb. 18	2.° Nov. 20	2.° April 20	4.° Jan. 22 *13	0.° Feb. 6, 1897
Number of clear days	130	124	133	126	149	152	183	129
Number of fair days	106	123	104	114	98	66	49	111
Number of cloudy days	130	115	128	125	118	147	133	122
Number of days rain fell	134	128	134	116	132	142	140	128
Total rainfall	38.47 inches	36.16 inches	47.85 inches	32.93 inches	36.61 inches	35.91 inches	32.86 inches	38.37 inches
Greatest monthly rainfall	8.05 in. July	5.76 in. Nov.	6.79 in. July	5.56 in. Nov.	5.97 in. Aug.	5.64 in. Sept.	5.55 in. June	8.05 July 1896
Least monthly rainfall	0.71 in. Oct.	0.29 in. Sept.	2.15 in. Sept.	0.53 in. Aug.	.99 in. Dec.	.81 in. Oct.	0.63 in. Jan.	.29 Sept. 1897
Prevailing direction of wind	S. W	N. W	N. S. W	S.	S. W.	S. W.	S. W.	S. W.

*9 Jan. 10 and March 8. *10 July 5 and 6. *11 Jan. 21, March 2 and Dec. 18. *12 July 1, 22 and 29. *13 Jan. 22 and April 1.

METEOROLOGY—TABLE VIII.

SUMMARY BY YEARS AND GRAND SUMMARY FOR TWENTY YEARS FOR THE STATE.

For the State.	1883	1884	1885	1886	1887	1888	1889	1890	1891	1892	1893
Mean temperature.....	49.4°	50.6°	48.0°	49.6°	51.4°	49.5°	51.1°	52.4°	52.0°	50.0°	50.1°
Highest temperature....	98° Aug. 22	98° *1	101° July 21	98.6° July 7	108° July 18	102° Aug. 3	99.5° Aug. 31	103.1° Aug. 3	101° Aug. 10	103° July 25	102° July
Lowest temperature.....	-17.2° Jan. 22	-34.° Jan. 25	-31° Jan. 29	-21.5° Jan. 12	-21° Jan. 7	-15° Jan. 27	-13.5° Feb. 24	-4° Mch. 7	-5° Mch. 8	-25° Jan. 20	-24.°
Range of temperature...	115.5°	133.°	132.°	120.1°	129.°	117.°	113.°	107.1°	106.°	128.°	126.°
Greatest d'y range temp.	55.2° Mch 18	50° *2	58.5° Jan. 20	57° Dec. 11	57° April 11	50.°	53° Mch. 30	49.5° April 11	50° *3	51° Sept. 25	54.°
Avg. no. days rain fell..	140	145	148	131	121	125	118	149	120	121	113
Mean yearly rainfall....	44.98 inches	40.19 inches	30.08 inches	36.71 inches	33.63 inches	39.64 inches	33.53 inches	50.33 inches	38.61 inches	37.16 inches	39.63 inches
Mean daily rainfall......	.123 inch	.110 inch	.104 inch	.100 inch	.092 inch	.108 inch	.092 inch	.138 inch	.106 inch	.102 inch	.108 inch
Prevailing wind........	S. W.........	S. W.........	S. W.........	S. W.........	S. W.........	S. W.........	S. W.........	S. W.........	S. W.........	S. W.........	S. W.........
	1894	**1895**	**1896**	**1897**	**1898**	**1899**	**1900**	**1901**	**1902**	**Summary for twenty years.**	
Mean temperature......	52.4°	49.9°	51.8°	50.6°	52.0°	51.5°	52.2°	50.2°	50.6°	50.8°	
Highest temperature....	105° *4	106° July 20	103° April 17	113° July 4	105° July 1	105° Sept. 6	103° *8	109° July 22	100° July 8	113° July 4, 1897	
Lowest temperature.....	-27° Dec. 29	-24° Feb. 6	-18° *6	-27° Jan. 26	-20° Feb. 3	-39° Feb. 10	-20° *9	-20° Feb. 23	-17° Feb. 14	-39° Feb. 10,'99	
Range of temperature...	132.°	130.°	121.°	140.°	125.°	144.°	123.°	129.°	117.°	152.°	
Greatest d'y range temp.	60° Oct. 19	59° *5	53° Mch. 25	67° *7	....	....	57° Feb. 9	61° Dec. 14	56° May 4	67° Sept. 28,'97	
Avg. no. days rain fell..	100	89	124	110	121	107	107	107	114	121	
Mean yearly rainfall....	29.75 inches	28.46 inches	39.58 inches	38.54 inches	43.78 inches	34.51 inches	32.87 inches	32.98 inches	37.58 inches	37.13 inches	
Mean daily rainfall......	.081 inch	.070 inch	.108 inch	.105 inch	.119 inch	.094 inch	.090 inch	.090 inch	.103 inch	.102 inch	
Prevailing wind........	S. W.........	S. W.........	S. W...........	S, W......	S. W...........	S. W...........	S. W...........	S. W	S. W	S. W..........	

*1 Sept. 28 and Oct. 1. *2 Sept. 5 and Dec. 4. *3 April 27 and 30. *4 July 18 and 19. *5 Jan. 15 and March 27. *6 Feb. 9, 10 and 11th. *7 Sept. 25 and 26. *8 July 4, Aug. 6 and 10. *9 Jan. 29 and Feb. 27.

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PRESS BULLETINS.

The following press bulletins have been issued since our last report:

No. 240, June 1, 1902. CAUSTIC SODA FOR BORDEAUX MIXTURE.

The Ohio Experiment Station has recommended the use of Soda Bordeaux mixture in the treatment of vineyards for grape rot and the spraying of apple trees for the bitter-rot of apples. Numerous persons have inquired where the powdered caustic soda may be obtained of such tested strength that the process of testing its strength at home may be avoided. Pursuant to the wish that such source of supply might be developed, the Lawrence Publishing Co. of the Ohio Farmer, Cleveland, Ohio, have arranged to supply powdered caustic soda of tested strength at the following price f. o. b., Elyria.

Caustic soda, 10 lb. tin at 65c.
" " 25 lb. tin at 5.4c per lb. or $1.35 per tin.
" " in multiples of 25 lbs., 5.4c per lb.

AMOUNT OF CAUSTIC SODA TO USE.

Samples of the grade offered have been tested by the Experiment Station and should be used at the rate of *1 lb. 3 oz. of the caustic soda to 4 lbs. of copper sulfate* in 50 gallons of the mixture, which is Soda Bordeaux mixture. The formula, using this grade of caustic soda, is as follows:

SODA BORDEAUX MIXTURE.

Copper sulfate (blue vitriol)	4 lbs.
Caustic soda (sodium hyroxid)	1 lb. 3 oz.
Water, to make	50 gallons.

The solution of copper sulfate and caustic soda should be put into the barrel or tank only after nearly filling it with water, and afterwards thoroughly agitated by pumping the mixture back into the tank through the hose with nozzle removed. The mixing of spray preparations of this sort outside the spray tank is unnecessary—the process may be best conducted by putting the ingredients directly into the tank—but not until water enough has been added to make them quite dilute.

Orders for the caustic soda should be addressed to the Ohio Farmer, Cleveland, O.

Inquiries for spraying directions in using caustic soda should be addressed to the Experiment Station, Wooster, Ohio.

No. 241, July 14, 1902. THE CHINCH BUG CAMPAIGN. (By Chas. E. Thorne.)

The multitude of letters now received daily at the Ohio Experiment Station indicate that the chinch bug is threatening immense injury to the corn and oats crops of the State, and it is feared that farmers are expecting too much of the fungus which the Station is distributing.

In the first place, the amount of this material which it is practicable to send out is extremely small, and it can only infect a comparatively small number of bugs at the best; the infection, moreover. will require four or five days, by which time the army of bugs will have done great injury. Our advice is, therefore, not to wait for the fungus, but to organize a campaign at once for the immediate relief of the crop, depending upon the fungus to finish the work by destroying the bugs which would otherwise live over winter to menace the crops of next year.

The chinch bug, though able to fly, prefers to travel on the ground, and its migration from wheat to oats or corn may be intercepted by making a V-shaped trench, as with the corner of a hoe or the outside tooth of a cultivator, and pouring in a little coal tar. A line of tar an inch across will be sufficient. When a crust forms over the tar it must be freshened with a new supply. As the bugs enter a cornfield their progress may be impeded by frequent cultivation of the outside rows of corn, thus burying many of the bugs. When they cluster on the stalks of corn they may be killed by sprinkling with kerosene emulsion, made as follows, and thrown with sufficient force to wash them off the corn:

KEROSENE EMULSION.

Dissolve half a pound of soap in one gallon of water and heat to boiling; remove from the fire and while hot add two gallons of coal oil, churning the mixture with a force pump for fifteen minutes or until it resembles butter-milk. To each quart of this emulsion add fifteen quarts of water and apply with spray pump or sprinkling pot.

No. 242, July 21, 1902. GRAPE ROT PREVENTION. (By A. D. Selby.)

The Ohio Experiment Station has already called attention to the method of grape rot prevention by spraying, and to Soda Bordeaux mixture as well as to the source where caustic soda may be obtained for making the Soda Bordeaux mixture. These press bulletins wll be sent to those who apply

Warning is now given that spraying at six-day intervals is imperative while weather is so favorable for grape rot; also, that it is no longer safe to use the regular Bordeaux mixture except perhaps once on Catawba grapes. Upon Concords, and other varieties ripening with the Concords or earlier, ammoniacal copper carbonate or Soda Bordeaux mixture, preferably the latter, should be substituted, since the ordinary Bordeaux mixture will coat the grapes too much.

Grape growers are urged to substitute one of the last named sprays, by preference the Soda Bordeaux mixture, and to persist in the spraying until August 15; upon Catawbas one application should be made after that date.

No. 243, July 21, 1901. SPRAYING FOR BITTER-ROT OF APPLES. (A. D. Selby.)

The Ohio Experiment Station learns that the bitter-rot of apples has appeared, particularly upon susceptible sorts, in southeastern Ohio.

If prevented from gaining headway and destroying much of the apple crop the remedies must be prompt and the measures effective. For this purpose the Experiment Station recommends spraying at intervals of two weeks during the earlier period of outbreak. It believes that Soda Bordeaux mixture, concerning which the Station has already given out information, is probably the best fungicide for this purpose; the ammoniacal copper carbonate may also be used.

The period of greatest danger is upon the apple grower and the result must depend largely upon his efforts.

No. 244, July 28, 1902. LOSS OF LEAVES BY CHERRY LEAF-SPOT AND SHOT-HOLE FUNGUS. (By A. D. Selby.)

Several widely separated districts have reported to the Ohio Agricultural Experiment Station the defoliation of cherry trees by the leaf-spot fungus. Plum trees are liable to be similarly attacked by the shot-hole fungus, since the two effects are due to the same fungus, and the rainy weather has favored its spread. This may yet affect the plum trees and crop; though the cherry crop has been gathered the trees are liable to suffer. If all or most leaves drop, followed by new leaves and growth on either cherry or plum trees, the cold of winter may destroy them. For cherry trees, some good may yet result by treatment with *half-strength* Bordeaux mixture: upon plum trees in fruit, if too late to use the standard Bordeaux mixture, ammoniacal copper carbonate or Soda Bordeaux mixure should be sprayed at intervals of about two weeks.

It is urgent that plum and cherry growers should now begin, if they have not earlier done so, to try to avert such serious consequences of defoliation as be-fell plum trees in 1896-7, when many were killed by freezing.

No. 245, July 28 1902. TOMATO LEAF-SPOT AND MUSKMELON BLIGHT. (By A. D. Selby.)

The Ohio Experiment Station warns tomato growers to be on the alert for tomato leaf-spot and to begin early in their measures for its prevention. The prevailing wet weather is favorable to this disease, which may again prove as destructive as in 1898 and 1900. Spraying the plants with Bordeaux mixture at intervals of two to three weeks promises very large returns, should such moist weather continue.

Gardeners and truckers are also warned to begin spraying for downy mildew of muskmelons and cucumbers, should their plants promise to yield after the middle of August. Earlier spraying for this disease was not required, but from the present date forward, treatment should be made at intervals of 8 to 10 days if a late yield is anticipated.

No. 246, September 1, 1502. A TEN-YEAR COMPARISON OF VARIETIES OF WHEAT. (By Chas. E. Thorne.)

Thirty-four differently named sorts of wheat have been grown in comparative test at the Ohio Experiment Station for ten years past. One of these—Penquite's Velvet Chaff—is used as a standard of comparison, and for this purpose is grown on every third plot of the series, and the other sorts are valued as their yields rise above or below those of the Velvet Chaff plots between which they lie.

In the 10-year average the Mealy heads the list with an average yield of 4⅛ bushels per acre more than that of the Velvet Chaff. Poole and Red Russian, which are synonyms of the same variety, come next, with yields ranging from 3⅓ to 3¾ bushels per acre above that of the Velvet Chaff. (Harvest King is also Poole wheat, recently introduced under a new name.) Gypsy has yielded 3¾ bushels, and Early Ripe 3½ bushels per acre more than Velvet Chaff.

Varieties averaging between two and three bushels more than Velvet Chaff are Nigger, Fultz, Mediterranean and Currell's Prolific; while New Monarch and Valley and its synonym, Egyptian, nearly reach the two bushel mark, and Democrat has averaged more than one bushel in excess of the standard.

Jones' Square Head has averaged two and one-half bushels less than Velvet Chaff, and Jones' Winter Fife nearly two bushels less, while Early White Leader, Early Red Clawson, New Longberry, Martin's Amber and Royal Australian—a synonym of Clawson, have yielded nearly a bushel per acre less than Velvet Chaff.

American Bronze, Bearded Monarch, Deitz, Fulcaster, Hickman, Hindostan, Lebanon, Lehigh, Missouri Blue Stem, Rudy, Sibley's New Golden, Silver Chaff and Yellow Gypsy have given yields varying but little either way from that of the Velvet Chaff.

No. 247, September 8, 1902. HOW TO CIRCUMVENT THE HESSIAN FLY (By Chas. E. Thorne.)

So little complaint of the Hessian fly has been heard at the Ohio Experiment Station this season that there is ground for the hope that there will be no more trouble from it for a few years to come, but it will be well for farmers to be on their guard lest it reappear suddenly, as it did in 1899.

It is possible for every farmer to determine for himself whether the fly is likely to appear in destructive numbers in his wheat each season. To accomplish this, let a small strip of wheat be sown along one side of the intended wheat field about two weeks before the time when the main crop is usually sown in that particular locality. As soon as the wheat comes above the ground examine the young shoots carefully every day with a magnifying glass. A cheap lens, magnifying about three diameters, which can be bought of any optician or department store for a dollar or less, is sufficient. If the fly is present, its minute, reddish eggs, one-fiftieth of an inch long, will be found in the creases of the young wheat blades. Once seen under a glass these eggs can easily be seen by the unaided eye as red specks. Often two or more are found together, lying end to end.

Usually egg laying occupies about a week, and if the fly on her appearance finds a little wheat ready for her, she will soon deposit all her eggs, after which the main crop may safely be sown in the assurance that by the time it appears above the ground the eggs will all have been laid on the earlier sown wheat.

Many farmers suppose that the socalled "flax seeds," which are found in October and November at the base of the wheat stalk, are the eggs of the fly, but this is a mistake; these "flax seeds" are the full grown larvæ of the fly which undergo their transformation into the winged insect within the brown cases called "flax seeds."

No. 248, March 1, 1903. FRUIT LISTS. (By W. J. Green.)

These lists have been prepared in response to numerous inquiries concerning varieties of fruits. It is manifestly impossible to make a list of varieties of any kind of fruit that will suit all soils and conditions. To suit individual tastes is equally difficult, hence these lists must be regarded as suggestive merely.

They include many of the most reliable varieties, but not all, but there is none which does not do well somewhere. The tree planter should understand that the variety question is a very difficult one and needs careful and continued study. One must study the varieties in his own neighborhood. He must observe, read, inquire and compare, and at the same time he must have in his mind what characteristics he need in a variety. He must determine whether he will ship his fruit or market it near home, and if for home use then individual tastes of the members of the family are to be consulted. These lists may not answer all of the questions which any person may have in his mind, but should it be necessary to ask for further information, please be specific and state particularly what characteristics are desired.

The varieties are named in the order of ripening, or very nearly so.

APPLES.

Yellow Transparent—A Russian variety that promises to supersede the Early Harvest.

Red Astrachan—A valuable early sort for home use or market.

Early Harvest—One of the best early varieties for all parts of the state, but is quite subject to scab.

Oldenburg (Duchess of Oldenburg)—A valuable early variety suited to all sections.

Sweet Bough—The best early sweet apple for all sections.

Benoni—A late summer variety of excellent quality.

Munson's Sweet—A choice autumn sweet sort and reliable bearer.

Gravenstein—Esteemed chiefly for its good quality. One of the best early autumn sorts for home use.

Maiden's Blush—A valuable fall variety in all sections, for home use or market. Is subject to the apple scab and is greatly benefitted by application of fungicides.

Ohio Nonpareil—An excellent fall variety for cooking and sells well in market.

Wealthy—Bears young and abundantly. Good for culinary purposes.

Grimes' Golden—A valuable early winter variety for market or home use in all parts of the state, although it becomes a fall apple in the extreme southern portion. Its chief merit is high quality. Not subject to apple scab but is likely to be damaged by late spraying with Bordeaux mixture.

Jonathan—A choice winter variety for home use, also for market, when well grown. Tree a slow grower, hence better if top grafted.

Bailey's Sweet—A choice winter dessert variety. Sometimes affected by bitter rot.

Northern Spy—A fall apple in most parts of the state, but in a few localities in northern Ohio is a profitable winter variety. Very subject to apple scab and the apple worm, hence is greatly benefitted by spraying. Highly colored and of good quality.

Baldwin—One of the best winter varieties for the northern part of the state, but is a fall apple in the southern counties. Very prolific; bears every other year; not seriously affected by apple scab.

York Imperial—A good market winter variety for the central portion of the state. A good keeper but scalds in cold storage. Fruit variable in size.

Rome Beauty—The best winter market variety for southern Ohio, and does well in the central part of the state. It is greatly benefitted by application of Bordeaux mixture.

Gano—Much like Ben Davis in quality, but more highly colored.

White Pippin—A good keeper and excellent for culinary purposes.

Stark—A reliable winter variety but lacks color.

Ben Davis—Does much better in southern than in northern Ohio, but in no part of the state can it be grown to such perfection as in southern Illinois and Missouri. It is an early and prolific bearer of poor quality; is greatly benefitted by spraying with Bordeaux.

PEARS.

Wilder—A good early variety of fair quality.

Clapp's Favorite—A profitable early variety; a prolific and early bearer; does well on quince; is liable to rot at the core.

Bartlett—The best known and most popular summer variety for home or market. Tree quite subject to blight, and the foliage often drops prematurely. Is benefitted by spraying with Bordeaux mixture.

Angouleme (Duchess d'Angouleme)—A reliable and profitable fall variety; prolific; bears young; does well on quince.

Anjou (Beurre d'Anjou)—Not excelled by any other late fall variety for market or home use. Succeeds either as a dwarf or standard.

Seckel—Esteemed chiefly because of its high quality. Comparatively exemp from blight.

Flemish Beauty—A choice autumn sort, but must be sprayed with Bordeaux mixture to prevent leaf dropping and cracking of the fruit.

Kieffer—A profilic and and early bearer and seldom blights. Not of high quality but is suitable for canning. Blooms early and is often killed by spring frosts. Season, early winter.

Lawrence—A reliable winter variety; prolific and comparatively free from disease.

PLUMS.

Abundance—One of the best of the Japanese sorts.

Bradshaw—A fine large plum, suitable for home use or market. Ripens early but the tree is somewhat tardy in coming into bearing.

Moore's Arctic—Very hardy and reliable.

Lombard—Probably planted more extensively than any other variety, and has been found to be reliable in all sections of the state. The trees must be thinned or they will overbear. Not so much inclined to rot as some, but by no means exempt.

Reine Claude—Generally esteemed because of good quality and prolificacy, one of the best for market and not excelled for home use.

Grand Duke—One of the best late sorts.

Arch Duke—A fine late variety.

GRAPES.

Worden—Earlier than the Concord, otherwise much the same.

Green Mountain—One of the best early white grapes for home use, because of its excellent quality. Vigorous in growth, fairly prolific and comparatively free from disease.

Delaware—Esteemed for table use because of good quality, also valuable for market. Rather weak in growth and subject to rot.

Brighton—A choice red sort for home use.

Concord—The best general purpose grape known.

Niagara—A vigorous and prolific variety; somewhat subject to rot, but valuable for both home use and market.

PEACHES.

Greensboro—The first reliable variety to ripen. White flesh, freestone.

Mountain Rose—A reliable second early variety, suitable for home use or market; comparatively hardy; inclined to overbear.

Champion—Flesh white, quality excellent. One of the best for home use.

Old Mixon Free—Recognized as a standard variety in all parts of the state. Flesh white, and of a good quality.

Crosby—A reliable variety for home use, bnt too small for market, unless severely thinned. Yellow and of good quality.

Fitzgerald—Is a fine, hardy, yellow variety.

Elberta—Comparatively new, but quite generally found to be reliable, wherever tested; one of the best for shipping. Probably the most popular peach in all sections, at the present time.

Smock—A very popular variety in all parts of the state.

Salway—A profitable late sort along the lake, and in southern Ohio, but does not always ripen in other parts of the state.

No. 249, March 23, 1903. IMPURITIES IN ALFALFA AND CLOVER SEEDS. ALFALFA DODDERS A MENACE. (By A. D. Selby.)

Recently a number of samples of red, alsike and crimson clover and of alfalfa seeds have been examined at the Ohio Experiment Station under the direction of the botanist. These show no evidence of serious lack in respect to vitality, but in respect to weed seed impurities the outcome is a warning against employing seeds that have not been recleaned. Recleaned seeds show so much greater freedom from impurities than the seed as it comes from the clover huller, that recleaning becomes a necessity. To put it another way: the seed is free from impurities in proportion to the number of times recleaned. The farmer cannot afford to seed his land to plantains, to new weeds of any kind nor to infest the clover field with dodder.

During the season of 1902 attention was frequently called to something wrong in newly seeded alfalfa fields, and incidentally to the fact that much more alfalfa is being sown each season. Patches in new alfalfa fields were often ound where dodder had killed the stand over a circular area.

ALFALFA DODDERS IN THE SEED.

The alfalfa seed comes very largely from the irrigated region, especially rom Colorado and Utah. Two kinds of dodder seeds are common in this western alfalfa seed: the kind more common has seeds that will pass through a 20-mesh sieve, while the other is more nearly the size of the alfalfa seed. More than one half the samples of alfalfa seeds examined in Nevada two or three years ago contained the small seeded dodder, while more than one-fourth of them contained the larger dodder seed. Of fifteen samples of alfalfa seed, recently examined in Ohio, two contained seeds of the smaller seeded and two of the larger seeded dodder, but the number of seeds found of the small seeded dodder was many times that of the larger seeded.

The many cases of dodder-killed patches in alfalfa fields last season and the facts just stated show that *no one should sow alfalfa seed without recleaning, through a sieve of 20 meshes to the inch, before sowing.*

It is hoped this warning will reduce the number of dodder infested alfalfa fields the present season.

No. 250, March 30, 1903. THE LIME-SULPHUR-SALT WASH FOR THE SAN JOSÉ SCALE. (By P. J. Parrott.)

The lime, sulphur and salt wash is invariably used in California and much of the Pacific Coast for the control of the San José Scale. Experienced orchardists there have used it for many years and have demonstrated that it is, when properly made and applied, a successful remedy for this pest. The use of the wash in the East has been delayed because of the belief that it was not adapted to eastern climatic conditions, by reason of the uncertainty of securing two or three weeks of dry weather following treatment. But extensive experiments with this wash during the past two years in Illinois, Georgia, New Jersey, New York and Ohio clearly prove that the wash is an efficient remedy in these states, even when applied during what was considered extremely unfavorable weather. In spite of frequent heavy rains the wash adhered well to the trees. It appears to be a very promising remedy for the San José Scale and is recommended to the orchardists of Ohio as deserving a thorough trial.

THE WASH AND HOW PREPARED.

There are many formulæ for preparing this wash. They vary as a rule in the proportion of lime. But the one that is more extensively used is made as follows:

Lime, unslaked, 15 pounds.
Sulphur, ground, 15 pounds.
Salt, 15 pounds.
Water, 50 gallons.

Slake the lime in a small quantity of hot water to form a milk of lime, then add the sulphur and salt and stir in to form a thin paste. Dilute the mixture with twenty gallons of water and boil vigorously for from one and one-half to two hours, when enough water should be added to make the full fifty gallons.

The mixture is then ready to put into thé spraying machine, but it should be strained through common wire window screening as it is being poured into the barrel or tank. The mixture should be applied to the trees while hot if possible. When well made it is a brownish liquid, with a strong, sulphurous odor.

WASH PREPARED IN IRON KETTLE.

For the preparation of small quantities of wash—three to four hundred gallons a day—a couple of 60 gallon iron kettles will be found satisfactory. In using these care should be takcn to keep the mixture vigorously boiling and well stirred to prevent the caking and burning of the materials upon the sides of the essels.

WASH PREPARED BY STEAM.

The wash made by steam is more easily prepared and is as a rule better made. In Bulletin No. 20, Division of Vegetable Physiology and Pathology, U. S. Dept. of Agriculture, Pierce describes the use of three barrels connected with steam which, to the writer's knowledge, makes a handy arrangement. "The upper heads of the barrels should be removed and each nailed in two parts to serve as a cover for the barrels. From a boiler a steam pipe should extend horizontally over the row of barrels not less than two feet above. The farther end extends downward at a right angle by means of an elbow, to within six inches of the bottom of the last barrel. Where the pipe passes over the first and second barrels, downward extending pipes are connected by means of proper couplings and extend to within six inches of the bottoms of the respective barrels. The inflow of steam is controlled for each barrel by a valve in the downward extending pipe about eighteen inches above the barrel. With sufficient steam a barrel of water may be brought to the boiling point in five minutes. By using three barrels two can be filled with boiling spray while one is being emptied." The barrels are set on a platform about 18 inches high and the cooked material is drawn off through holes near the bottoms. If one does not possess a steam boiler it is often possible to arrange with the local creamery company or some concern where steam is employed, to provide some such apparatus, for a small charge. Some orchardists prefer to use a large vat or cask of eight hundred or a thousand gallon capacity and make that amount of mixture at one boiling.

APPLICATION OF WASH.

The wash should be applied in the spring just as the buds commence to swell. Spraying should be done thoroughly so that all parts of the tree receive treatment. It is well to make a second round of the orchard to cover up missed spots. The ordinary spraying machinery, used for the application of Bordeaux mixture, is satisfactory in applying this wash. To keep wash well mixed a good agitator is necessary. If the pump lacks one then stir the mixture fre quently during spraying operations with a stick. Clogging of the suction valve can be prevented by elevating the pump a little so that the suction strainer may be above the sediment that settles on the bottom of the barrel. The wash is very corrosive and will cause slight sores to men and horses if work is long continued. During spraying operations men should protect their hands with leather gloves and horses should be covered with light blankets. Nozzles, pumps and hose should be cleaned with water after every operation to prevent clogging and further corrosion.

THE OREGON WASH.

This is prepared by substituting a pound and a half of blue vitriol in place of the salt in the above formula, the crystals of blue vitriol being dissolved in hot water and the solution added to the slaked lime. It is believed that the use of blue vitriol results in a wash that acts more quickly upon the scales, besides making it a more efficient fungicide.

SOME REMARKS.

These washes will sometimes kill the tips of the peach trees; aside from this no other injuries have resulted in the writer's experience from applications made at the proper time, even when used in excessive quantities. These washes are recommended to orchardists who have not learned to use crude oil with safety, or who are afraid that their trees are beginning to show injury from the crude oil or will not stand many more applications of it. Failures in the use of lime, sulphur and salt, or the Oregon wash, arise largely from insufficient boiling and lack of careful work in spraying. Properly made and applied these washes are safe and efficient, and for the average orchardist are very satisfactory remedies for the San José Scale.

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