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Circular No. 95 - Annual Summary of Publications

Blanche Condit Pittman

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ANNUAL SUMMARY OF PUBLICATIONS

July 1, 1930 to June 30, 1931

BLANCHE CONDIT PITTMAN

UTAH AGRICULTURAL EXPERIMENT STATION
Utah State Agricultural College
LOGAN, UTAH
ANNUAL SUMMARY OF PUBLICATIONS
July 1, 1930 to June 30, 1931

BLANCHE CONDIT PITTMAN

Circular No. 95 contains a summary of publications issued by the Utah Agricultural Experiment Station, through its Editorial and Publications Division, for the fiscal year ending June 30, 1931. The publications of this Station are no longer sent to a general mailing list (except in case of libraries, state editors, and Utah county agricultural agents, vocational teachers, and agricultural inspectors); otherwise, they are sent only on request. Copies of the publications listed will be sent without charge to those requesting them as long as the supply is available. However, in the case of reprints (abstracts of technical and scientific articles), the supply is limited and requests for these should be confined as far as possible to those only who are especially interested in this phase of experimentation. (See last page for instructions for making requests for publications).

BULLETINS

Bulletin 220—Biennial Report of Utah Agricultural Experiment Station
July 1, 1928 to June 30, 1930
P. V. Cardon et al.

A summary of the results of two years of agricultural research in Utah, this publication constitutes a handbook of facts which have already wide use in this state. More than 70 research projects carried on during this period are reported from the various divisions of the Station.

Bulletin 221—Snakes of Utah
H. J. Pack

This publication, compiled from the notes of the late Dr. Herbert J. Pack by his associate, G. F. Knowlton, describes and illustrates members of four families of snakes found in Utah and is of interest to students of general biology. The illustrations and descriptions assist in the identification of the snakes commonly encountered in the field. A glossary of the terms used in the description of snakes and a good bibliography are included at the end of the bulletin.

Bulletin 222—A Quarter Century of Dry-farm Experiments
Nephi, Utah
A. F. Bracken and George Stewart

Results of experimentation on the Nephi Dry-farm Substation from the time of its establishment in 1903 to 1929 are embodied in
this publication. Weather records at the Nephi Substation show an average annual rainfall of 13.05 inches with measurements covering a 32-year period from 1893 to 1929, inclusive. During the months from April to October, inclusive, for 26 years there was a total evaporation of 47.35 inches. Disking in the fall has been found to decrease yields. The practice of burning stubble is not advised except under special conditions. There is practically no difference between fall and early spring plowing, but between early spring plowing and that done as late as July 1 there is a decrease of from 24 to 13 bushels an acre. On spring-plowed land left rough and uncultivated, the yield is equal to spring-plowed fallow harrowed during the fallow period. The same treatment for all plowing showed the advantage to be with the normal tillage of the fallow. Frequent tillage of fall or spring plowed land reduced yields as compared to normal tillage.

**Bulletin 223—Feeding Value of Alfalfa Hay Treated with Calcium Arsenate**

H. J. Frederick

Horses, cattle, and sheep were fed for 80 days on hay dusted with two and three times the amount of arsenic commonly used for destroying alfalfa weevil without showing toxic effects. Results of this experiment indicate that alfalfa hay dusted with 2 pounds of calcium arsenate (the amount commonly used to destroy alfalfa weevil) is not detrimental to livestock and may be fed with impunity for at least one feeding season. This test was conducted cooperatively with the U. S. Bureau of Entomology, with offices in Salt Lake City.

**Bulletin 224—Muck Soil Investigations**

LeMoyne Wilson and George Stewart

The Sanpete County Experimental Farm, located three miles west of Ephraim, Utah, was established in 1927 for the primary purpose of making careful tests of the agricultural possibilities of the arid peat soils of Utah and if possible to discover successful methods of farming on these soils. While little experimental work with peat and muck soils has been done in the United States, these authors have offered certain specific recommendations based on four years' experimental study on the muck soils of the Sanpete County Experimental Farm.

**Bulletin 225—Progress Report of Carbon County Experimental Farm**

I. D. Zobell and George Stewart

This publication represents a progress report of the work carried on at the Carbon County Experimental Farm, located four miles south of Price, Utah, since its establishment in 1927. Since the soils of this locality are low in humus, specific crop rotations are needed. Included in the bulletin will be found recommended rotations which have proved satisfactory for this region as well as general recom-
mendations on plants and crops best adapted to the Carbon County district as a whole.

**Bulletin 226—Alfalfa-seed Production**
J. W. Carlson and George Stewart

Utah's alfalfa-seed crop is of far-reaching importance. Since 1919 the growing of this crop has been a major industry in western Millard County and in that part of the Uintah Basin situated in Utah, both peculiarly adapted by climate for the successful growing of alfalfa-seed. In this 54-page bulletin, technical in nature, will be found the authors' findings in the successful production of alfalfa-seed for a six-year period, 1925-30, inclusive.

**Bulletin 227—Soft-curd Milk**
R. L. Hill

The Hill test for the determination of the curd character of milk is described in detail and furnishes a means of segregating those cows which give soft-curd milk, the most desirable standard being 20 grams or under of curd tension. Soft-curd cows have been located in all breeds examined. In general, milk with a high fat content is more likely to be soft-curded. Soft-curd milk is sometimes found with a high fat content. The presence of fat in milk has a softening effect on the curd; its removal by separation has been found to increase the hardness of the curd of milk. Prolonged heat treatments soften the curd of the milk. Because of heat treatments and final prolonged sterilization, evaporated milk is soft-curded. From case studies made on infants it is found that the curd test is an index to the digestibility and food value of milk for infants.

**Bulletin 228—Twenty Years of Rotation and Manuring Experiments at Logan, Utah**

George Stewart and D. W. Pittman

From a series of experiments conducted for twenty years on the Greenville Experimental Farm it was found possible to maintain or to build up a high state of productivity in the soil by the use of farmyard manure and a good cropping system. Manure was found to be most effective on sugar-beets; in fact, sugar-beets were not successfully grown without manure. It was also effective on alfalfa, potatoes, and corn but less effective on the small grains where it usually caused lodging. Frequent and moderate applications of manure were much more effective than the same quantity of manure used as occasional heavy applications. Almost any rotation system was beneficial to the small grains. Sequence in the cropping order was important also for potatoes, for alfalfa, and for corn and was essential for sugar-beets on nematode-infested land. Sugar-beets after small grains did not do as well the first year as when potatoes or peas came between the small grain and the beets. Where properly manured and where there was no nematode infestation, sugar-beets following sugar-beets for two or three years in succession were better
than when following other crops. Alfalfa-hay yields usually began to decrease when the stand was four or five years old, except on land long and heavily manured. A rotation system, including alfalfa and cultivated crops and with moderately heavy manuring, was the most successful in maintaining a high yield of all crops studied.

Bulletin 229—Production Study of 160 Dairy Herds, Wellsville, Utah, 1929
George Q. Bateman

A survey of 160 dairy herds at Wellsville, Utah, showed that there were 2522 dairy cattle being maintained on 12,384 acres of land, or one dairy animal to 4.9 acres of land (both dry and irrigated), or one milking cow to 2.3 acres of irrigated land. Of these 2522 dairy cattle, 1682 were milking cows and 840 heifers, 303 of which were bred. This number of heifers should be adequate for replacement purposes. The number of dairy cattle in proportion to land area seems to be about as high as it should be. Approximately all dairy feeds produced are being fed. An increase in number of dairy animals would necessitate an increase in the acreage of feed crops or the shipping in of feeds, neither of which is desirable. Two sources for obtaining more feed to maintain a high level of production are suggested: (1) By increasing the carrying capacity of the pastures themselves and (2) by using part of the wheat crop as dairy feed or changing some of the wheat land to barley, provided it is adapted for barley production.

Bulletin 230—Progress Report of the San Juan County Experimental Farm
James H. Eagar and A. F. Bracken

With a dry-farm area of approximately 600,000 acres, one-third to one-fourth of which is covered with timber, San Juan County, located in the southeast corner of Utah, presents an entirely different type of study than other parts of the state. The elevation varies between 6000 and 7200 feet. The soils vary in depth from a few inches to several feet and vary in texture from fine sandy loams to heavy clays. Frost is a major factor in crop production. Because of the distance to shipping points, the chief problem in this section is transportation; shipping charges are prohibitive for products which have a low value per unit of bulk. The ultimate purpose in establishing this Station in 1925 was to determine the possibilities of alfalfa-seed production in this area; however, during the five years in which experimental data have been collected, alfalfa-seed formed only during one season and then in an insufficient amount to be profitable. Other crops under test have been corn, beans, sweet clover, field peas, root crops, winter and spring wheats, oats, and barley. Results of tests made are reported by the authors in this bulletin.
ANNUAL SUMMARY OF PUBLICATIONS

CIRCULARS

Circular 88—Annual Summary of Publications
July 1, 1929 to June 30, 1930
Blanche Condit Pittman

This circular contains a summary of publications issued by the Utah Agricultural Experiment Station from July 1, 1929 to June 30, 1930. In it the following bulletins and circulars are summarized: Bulletins Nos. 212 to 219, inclusive; Circulars 78 to 87, inclusive. Abstracts of twenty-one scientific articles which have appeared in various technical and scientific publications are also included.

Circular 89—Rules and Regulations for the Seventh Utah Intermountain Egg-laying Contest
Byron Alder

The rules and regulations of the Seventh Utah Intermountain Egg-laying Contest which began on November 1, 1930, extending for a period of 51 weeks, are set forth in this circular. A brief discussion is also given on the general care and management which the birds receive while in the contest.

Circular 90—Swine Production in Utah
Harry H. Smith

In this 28-page publication is found general information on the selection of the breeding boar and sow, the feeding of the breeding herd in general, farrowing, feeding the sow and litter, castration, feeding hogs for the market, general precautions in feeding, marketing, and judging hogs, sanitation, and housing and equipment.

Circular 91—Establishing Snow Courses and Making Snow Surveys
George D. Clyde

The measurement of the accumulated snowfall at the end of the precipitation season furnishes an important index to the probable water-supply to be derived from the snow cover. A system of snow surveying has been developed by which it is possible to measure the depth and water content of the snow cover at the end of the precipitation season. Surveys which form the basis of annual water-supply forecasts are now being made on the principal watersheds of Utah, California, and Nevada. Instructions for establishing snow courses for making snow surveys are included in this publication. It is a popular treatise and includes a brief description of the selection and establishment of the snow courses, snow surveying equipment, care of equipment used, making measurements of depth and water content, and recording of data. Suggestions are also given regarding proper clothing, shelter, food, and miscellaneous equipment for such surveys.
Realizing the importance of a thorough and dependable survey of the flood situation after the recurring floods of 1927 and of 1930, Governor George H. Dern, early in the fall of 1930, appointed a special commission of eighteen members to offer recommendation for future flood control. These eighteen members were all men of wide and practical experience in varied fields of activity. As a result of their findings, three reports were submitted to Governor Dern: (1) Ways and Means, (2) Flood Control Works, and (3) Causes and Prevention of Floods. These reports were assembled and embodied in one general report of 52 pages issued by the Utah Agricultural Experiment Station.

Circular 93—Better Sugar-beet Culture for Utah

George Stewart and D. W. Pittman

Climate, labor conditions, and the general farming system practised in Utah are all favorable for successful beet-growing. Bright growing weather, cool nights, and light fall frosts are advantageous. The chief biological handicaps are the sugar-beet nematode and the sugar-beet leafhopper. Proper rotation largely overcomes nematode injury. All practices which encourage early and vigorous beets lessen appreciably the injury from the leafhopper. Actual solution of the leafhopper problem depends on breeding a strain of sugar-beets resistant to curly-top disease transmitted by the leafhopper. These and various other problems of interest to the sugar-beet grower are discussed in this 32-page circular.

Circular 94—Control and Eradication of Bang's Abortion Disease

D. E. Madsen and W. H. Hendricks

The seriousness of Bang's abortion disease in Utah made it necessary to promote more definite plans toward its control and eradication. The economic losses encountered are brought about not only through the loss of calves but by the lessened milk production and by the decrease in sale value of the animals themselves. Because of effective methods of drug treatment has been found and because the use of bacterins and vaccines has not yet solved this problem, it becomes necessary to attack the disease by strict sanitation combined with the agglutination blood test. Three

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9Of the special committee appointed by the Governor to make this report, but one of the members was a member of the staff of the Utah Agricultural Experiment Station—R. J. Becraft, Associate in Range Management. One other member of the committee, R. W. Bailey, Associate Professor of Geology, is a member of the faculty of the Utah State Agricultural College. A third member, L. M. Winsor, is associated with the U. S. Division of Agricultural Engineering, Bureau of Public Roads, with offices at the Utah State Agricultural College.

10See Footnote 4

11State Veterinarian, State Board of Agriculture
such plans are suggested in this circular, written in cooperation with the State Board of Agriculture.

**ABSTRACTS OF SCIENTIFIC AND TECHNICAL ARTICLES**

The following scientific articles, called reprints for convenience, have been published in various scientific journals. These articles are chiefly of interest to technical students of these subjects who are readers of the scientific journals in which they are published and the work reported will more certainly come to their attention in this manner. In each case a limited number of reprints has been ordered.

**REPRINTS**

**Reprint 151—Effect of Physical Curd Character of Milk on the Quality, Yield, and Physical Texture of Cheese.** By R. L. Hill and A. C. Merrill. In UTALH ACADEMY OF SCIENCES PROCEEDINGS, 7 (July, 1930): 62-63. Results indicate that (1) the soft-curbed cheese requires more color to get the proper intensity for the market; (2) the soft-curbed cheese cures several times faster; (3) the body and texture of the hard-curbed cheese is much better, that of the soft-curbed being unsatisfactory even for market purposes since it is brittle and soft and has a tendency to break under the slightest strain; (4) the flavor of hard-curbed cheese is superior, being more delicately flavored and pleasing; and (5) the finish on the hard-curbed cheese is firmer and freer from curd cuts.

**Reprint 152—Studies on the Beet Leafhopper.** By George F. Knowlton. In UTALH ACADEMY OF SCIENCES PROCEEDINGS, 7 (July, 1930): 57-58. During 1928 and 1929, a large number of beets were inoculated with curly-top virus by means of infective beet leafhoppers, in connection with studies on curly-top resistance in sugarbeets. Studies on the breeding grounds showed many native and introduced plants to be hosts of the beet leafhopper, a few of the important hosts being listed. A report of the 1929 beet leafhopper damage in northern Utah is given briefly. Additional localities in which the beet leafhopper was collected during 1929 are listed.

**Reprint 153—Effect of Replaceable Sodium on the Physical Character of Alkali Soils.** By Willard Gardner and Evan Harris. In UTALH ACADEMY OF SCIENCES, 7 (July, 1930): 50-51. An attempt is made to throw some new light on the question as to the rate at which the process of leaching unaided by chemical means may tend to improve the physical character of a soil which has been saturated with sodium. The transmission constant has been measured for soils of varying percentages of sodium saturation, and on the basis of the experimental curves thus obtained an attempt has been made to

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12 Former Assistant Professor of Dairying, Utah State Agricultural College
13 Graduate student, Departments of Physics, Soils, and Irrigation and Drainage Engineering
compute the probable length of time required for restoring proper physical condition to soils variously affected with alkali.

Reprint 154—The “Spitting” Habit of Lepidopterous Larvae. By Herbert J. Pack. Compiled by G. F. Knowlton. In JOUR. ECON. ENTOM., 23 (August, 1930): 736-738. Certain lepidopterous larvae including the gooseberry fruit worm, the peach twig borer, the bud moth and the lesser bud moth were found to invariably reject the first mouthfuls of food when entering the host plant. These larvae all characteristically feed within the host. Observations on three species of lepidopterous larvae, that feed externally, showed that none of these reject the first mouthfuls of food.

Reprint 155—The Relation of Type of Topping to Storage Losses in Sugar-beets. By C. M. Tompkins and S. B. Nuckols. In PHYTOPATH., 20 (August, 1930): 621-635. This paper constitutes a preliminary report on the correlation of storage losses in sugar-beets with types of topping. More than 10,000 beets were examined and classified as healthy or diseased. All beets were further classified according to the five divisions adopted for the description of the types of topping of commercial sugar-beets. Approximately 51 per cent of the total number of beets examined were topped at the base of the lowest leaf scar, or the commercial standard, 37 per cent of which were healthy. A marked decrease in numbers of diseased beets resulted when beets were topped one-fourth inch and one-half inch above this line, while a decided increase in numbers of diseased beets occurred when the crowns were severed one-fourth inch and one-half inch below this line.

Reprint 156—Artificial Tripping of Flowers in Relation to Seed Production. By John W. Carlson. In JOUR. AMER. SOC. AGRON., 22 (September, 1930): 780-786. Studies conducted at the Uintah Basin Alfalfa-seed Experimental Farm, during the seasons 1926-28, inclusive, show that artificial tripping of alfalfa flowers or seed production resulted in an average increase in seed production of 140 per cent, as compared with natural development of the flowers. Seedpods formed as a result of artificial tripping attain to normal maturity under natural conditions and are fully equal to those formed. It would appear from the data presented that artificial tripping in alfalfa results in greater stability and regularity in the subsequent behavior of the flowers. No attempt has been made to discover methods of effecting the tripping in a manner that might be important commercially.

Reprint 157—Notes on Utah Lachnea (Aphididae). By George F. Knowlton. In CANAD. ENTOM., 62 (July, 1930): 152-161. This paper records seventeen species of Lachneids that occur in Utah, principally on conifers. Several of the species are described and illustrated. In-

14See Footnote 3
15Formerly Assistant Pathologist and Associate Agronomist, respectively, Office of Sugar Plants, Bureau of Plant Industry, U. S. Department of Agriculture.
cluding one subspecies that is described as new. Only a few of these forms have been taken in damaging numbers up to the present time.

Reprint 158—The Microflora of Leached Alkali Soil. By J. E. Greaves and J. Dudley Greaves\textsuperscript{18}. \textit{In} BOTAN. GAZ., 90 (October, 1930): 224-229. The bacterial activities of soils were found to be greatly modified by soluble salts. The numbers of bacteria, ammonifying, and nitrifying powers of the “alkali soils” tested were not fully restored by the leaching of the soil with water. The extent to which restoration took place varied with the kind and concentration of salts present. Leaching was found to be less effective in the presence of chlorides than in the presence of sulfates. The leached “alkali soils” studied rapidly fixed when seeded into Ashby media; sulfates accelerated nitrogen fixation. Fifty-six per cent of the microorganisms obtained in pure cultures from Ashby agar fixed nitrogen when seeded into soil containing mannite. The beneficial bacteria of the soil survive for long periods in soils containing comparatively high concentrations of chlorides and sulfates.

Reprint 159—Notes on Utah Hemiptera. By H. J. Pack\textsuperscript{17} and G. F. Knowlton. \textit{In} CANAD. ENTOM., 62 (November, 1930): 248-250. This paper records the occurrence of 36 species of sucking insects belonging to the Hemipterous superfamily Scutelleroidea. Several of the forms considered are frequently injurious to farm crops in Utah.

Reprint 160—A Mathematical Study of the Decrease of Crop Yields. By J. Dudley Greaves\textsuperscript{18}. \textit{In} SOIL SCIENCE, 31 (February, 1931): 115-122. The rate of increase of crop yield with increase of the deficient element is proportional to the magnitude of the deficiency of the limiting nutrient from an optimum concentration. The time-rate of depletion of a deficient element, provided none is added from an outside source, is proportional to the product of the soil’s content of the deficient element and the crop yield.

Reprint 161—A New Spring Balance for Measuring Water Content of Snow. By George D. Clyde. \textit{In} SCIENCE, 73 (February, 1931): 189. A satisfactory spring balance for weighing snow cores in the field must be light, durable, and accurate. The tubular scale developed at the Utah Agricultural Experiment Station satisfies these requirements. It is constructed of seamless drawn brass tubing and a spiral spring in such a way that the spiral spring is attached to one end of the inner tube and the other end of the outer tube. When not in use, the inner tube telescopes inside the larger one. The inner tube is calibrated in inches’ depth of water and the zero is on the outer tube. As the spiral spring extends under load the inches depth of water is read on the inner tube opposite the zero on the outer tube.

Reprint 162—Notes on Utah Heteroptera and Homoptera. By George F. Knowlton. \textit{In} ENTOM. NEWS, 42 (February-March, 1931): 40-43; 68-72. The occurrence of 111 species of insects in this group is

\textsuperscript{10}Graduate student, Department of Bacteriology and Chemistry
\textsuperscript{17}See Footnote 3
\textsuperscript{18}See Footnote 16
recorded, including some injurious forms, and a few species that have not hitherto been recorded as being present in Utah.

Reprint 163—The Microflora of a Rich Sulphate-Containing Soil. By J. Dudley Greaves. In JOUR. AGR. RSCH., 42 (February, 1931): 183-186. Ten-kilogram portions of alkali soil rich in sulfates were leached for a period of two years from which 67.8 grams of sodium sulfate and 12.7 grams of sodium chloride were obtained. One crop of crimson clover and two of barley were grown. Analysis showed a gain in N₂ content, amounting to 1142 pounds per acre-foot. The soil was plated on Ashby agar and showed 3,855,000 colonies per gram. Twenty-one organisms were studied in detail, sixteen of the most active organisms being reported. Of the twenty-one organisms, six were fungi, thirteen bacilli, and two cocci. Eight were motile. All but two of the organisms were gram-positive. Nineteen liquefied gelatin, eighteen hydrolyzed starch and twelve peptonized milk, nine reduced nitrates, thirteen produced indole, fifteen fermented glucose, four lactose, and six sucrose.

Reprint 164—The Late Blight of the Sugar-beet. By B. L. Richards and C. M. Tompkins. In PHYTOPATH., 21 (March, 1931): 289-314. Late blight as it occurs in Utah is characterized ordinarily by a sudden collapse of leaf tissue in areas ranging in size from mere pinhole spots to the entire tissue between the main veins. In later stages of the disease a high percentage of the tap roots may be partially or completely decayed by rots, initiated in the weakened roots by Phoma betae. Epidemics of late blight in Utah are correlated with abnormally low precipitation during June, July, and August. Cultural practices which result in poor soil tilth, low fertility, or a disturbed water balance may induce the disease. Heavy irrigations following a long period of drought are important in blight production and particularly the root-rot stage. Excess alkalinity and high organic content of the soil appear to be intensifying factors. The conclusion is drawn that late blight is of non-parasitic origin, resulting from an unbalanced water relation of the plant. Control measures consist in such cultural practices as will bridge over the critical drought period, when the young beets become definitely weakened, and will promote vigorous growth throughout the entire season. The symptoms of late blight are described in detail and an extensive review of the literature is included in the discussion.

Reprint 165—A Quarter Century of Dry-farm Experiments at Nephi, Utah. By A. F. Bracken and George Stewart. In JOUR. AMER. SOC. AGRON., 23 (April, 1930): 271-279. Successful dry-farming depends upon fall or early spring plowing preceded by no previous tillage and fallowed by only sufficient cultivation of the fallow to keep weeds under control. Frequent harrowing of the fallow de-

19Ibid
20Formerly Assistant Pathologist, Office of Sugar Plants, Bureau Plant Industry, U. S. Department of Agriculture
21See Footnote 4
creases the yield. Seeding results indicate that good stands of grain are secured with the ordinary drill by seeding 4 to 6 pecks of clean seed to an acre treated with copper carbonate, between September 15 and October 1. Earlier seeding is advisable, provided soil moisture conditions are favorable. Cropping tests show alternate wheat and fallow to be more profitable than continuous wheat growing or wheat in rotation with row crops such as peas, corn, and potatoes. Peas plowed under as green manure has not increased the yield of wheat, but barnyard manure applied at the rate of 10 tons each alternate year or every four years has favorably affected the yield of wheat over 20 per cent. Fall wheats with Sevier, Kanred, and Nephi Station Turkey 926 lead in the winter wheat varietal trials; these wheats double the yield of Early Baart the leading spring variety. Bulgarian winter barley has given a yield in pounds equal to Kanred wheat.

Reprint 166—The Wheat Strawworm, Harmolita grandis Riley, in Utah, 1930. By George F. Knowlton. In JOUR. ECON. ENTOM., 24 (April, 1931): 414-416. The wheat strawworm, Harmolita grandis (Riley), is generally distributed throughout the irrigated and dry-farm wheat sections of northern Utah. The infestation in this area was moderately heavy during 1930, one-third of the culms examined in the fall being infested. The winged and wingless forms of this insect are illustrated.

Reprint 167—Some Facts Concerning Potato Storage in New York22. By E. V. Hardenburg23 and A. L. Wilson. From the PROCEEDINGS OF SIXTEENTH ANNUAL MEETING OF POTATO ASSOCIATION OF AMERICA (December, 1929): 168-177. A survey of farm potato storage houses was conducted in New York during the summer of 1929. Over 200 farm storages were visited. These were grouped into three classes: (1) house cellars, (2) barn basements, and (3) bank storages. House cellars were found to be most numerous and as a class the least efficient, although in many cases they were so constructed and managed as to provide good storage. Although in many cases provision was made for potato storage when barns were planned, generally speaking it is of secondary importance and of doubtful efficiency. The bank storage is the most efficient type of potato storage because of better temperature control. The humidity in house cellars is decidedly too low and results in heavy shrinkage, while in many bank storages it is too high and results in condensation of moisture on the potatoes.

Reprint 168—Hydrogen-ion Concentration in Relation to the Growth of Onions24. By A. L. Wilson. From PROCEEDINGS OF AMERICAN SOCIETY FOR HORTICULTURAL SCIENCE, 1930: 524-528. Results of an experiment to determine the effects of hydrogen-ion concentration upon the growth of onions in nutrient solutions

22No reprints available
23Professor of Vegetable Crops, Cornell University, Ithaca, New York
24No reprints available
are reported in this paper. Onion plants were grown in a nutrient solution adjusted over a reaction range of from pH 3.5 to pH 8 at half pH intervals. The total amount of growth and the increase in weight of the plants during the experimental period were determined on both a fresh- and a dry-weight basis. Three separate experiments were conducted under slightly different conditions of light, temperature, and length of day. The data indicate that while the growth of onion plants is influenced by these conditions, it may be expected to take place equally well over a reaction range of from pH 5.5 to pH 7.

Reprint 169—Inheritance in a Wheat Cross between Hybrid 128x White Odessa and Kanred. By George Stewart and R. W. Woodward. In JOUR. AGR. RSCH., 42 (April, 1931): 507-520, Kanred, one of the best winter wheats in Utah, was crossed with a bunt-resistant strain (Hybrid 128xWhite Odessa) obtained from the Washington Agricultural Experiment Station. The genetics of plant characters was studied in the F₃ generation as a means of determining the nature and number of the genotypes of the F₂ plants. There was found a one-factor difference for awns, P= .8190. Spike density also showed a one-factor difference, P= .5995, whereas kernel color was found to follow a three-factor difference, P= .7607. No cumulative color effect was found. So far as known, the first study of its kind ever made showed that compact spikes infected with bunt had 50 to 75 per cent longer spikelet internodes than did uninfected spikes on the same plant. Lax spikes were not materially influenced.

Reprint 170—Inheritance of Awns in a Kota x Hard Federation Cross. By George Stewart and B. Ira Judd. In JOUR. AMER. SOC. AGRON., 23 (June, 1931): 455-464. This cross was made to study awn inheritance and to discover, if possible, the number of factors involved. The parents used in the cross were Hard Federation, an awnless variety, and Kota, a fully awned wheat. In F₃, all the F₂ genotypes were tested by the breeding behavior of F₃ families, each from a single F₂ plant. Four true-breeding classes were found and five which segregated each in a distinct manner. When the observed proportions of each of these nine genotypes were studied by the closeness-of-fit method, the two P's were 0.97 and 0.45, both good fits. It seems reasonable to conclude that there is a two-factor difference for awns, independently inherited. The classes were clear-cut and definite when determined by the F₃ breeding behavior, and as carefully checked in the F₄ and F₅ generations.

26 See Footnote 4
26 Junior Agronomist, Office of Cereal Investigations, Bureau Plant Industry, U. S. Department of Agriculture
27 Graduate student, Department of Agronomy
Miscellaneous Publication 8.—Preliminary Report on Economic Factors Affecting the Production and Marketing of Poultry Products in Utah (October 1, 1928 to September 30, 1929). By W. Preston Thomas and Marion Clawson. June, 1931. 24 pp. This preliminary report on the analysis of the poultry business for 1929 will be followed by other progress reports for 1930 and 1931, after which a Station bulletin will appear giving the results for the 3-year period, 1929-31, inclusive. As indicated by the report, the average per-hen capital invested in 1929 was $3.16. The average per-hen production was 152 eggs, while egg-production cost was 26½ cents per dozen and 21 cents, with and without labor, respectively. The average cost of rearing pullets, not including labor, was 76 cents as compared to 96 cents including labor. Death loss for all farms averaged 16.5 per cent. The poultry business in Utah in 1929 was profitable, as indicated by profit and returns for labor on a per-hen basis of $1.10, with the better poultry farms averaging $1.73.

(College Series No. 325)

This series of publications is not for general distribution
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