

The M. A. C. RECORD.

MICHIGAN STATE AGRICULTURAL COLLEGE.

Vol. 9.

LANSING, MICHIGAN, TUESDAY, MAR. 15, 1904.

No. 25



Prof. A. R. Sawyer comes to M. A. C. to take charge of physics and electrical engineering. Prof. Sawyer was graduated from Leland Stanford Jr. University, and from Wisconsin University where he received the degree of E. E. After graduation he worked for a time at electrical engineering in a practical way. He then held the position of instructor in electrical engineering in Wisconsin University for two years, after which he took charge of a similar department in the State College of Kentucky, from which institution he comes to M. A. C. The members of the faculty and the student body bid him heartily welcome and assure him loyal support.

BASKET BALL.

The Grand Rapids Y. M. C. A. will play in the College armory next Saturday afternoon. This will be an interesting contest. Both teams are strong. M. A. C. won the first game by the small margin of one point. Come out to cheer and to encourage. Give Grand Rapids a hearty welcome.

M. A. C. 50, ALMA 38.

Director Brewer and 10 athletes left for Alma Saturday morning to take part in a dual meet. The general interest was good and Alma was, as usual, very enthusiastic. All the Alma students attended the meet and cheered both sides liberally. The M. A. C. boys were well treated. Alma is always hospitable, gentlemanly and game to the end. The meet was for exhibition purposes, and to try out the different men.

The shot-put was the first event. McKenna of M. A. C. won first and Moon, M. A. C. second. Distance 35 ft. 7½ in.

In the high dive Moon and Manning of M. A. C. tied for first. Since this gave M. A. C. first and second, the event was not decided between these men. Height, 5 ft. 6 in.

In club swinging, Swigert, last year's intercollegiate champion won first for Alma and Manning, M. A. C., second.

The high jump was won by Schenck, of Alma, Moon and Burrell, of M. A. C. and McCallum, of Alma, tied for second place. The points were divided, Alma receiving 6 and M. A. C. 2. Height 5 ft. 4 in.

Manning of M. A. C. and Hyney of Alma tied for first in parallel bars and each was awarded 4 points. In heavy weight wrestling, neither Angell of Alma nor Decker, M. A. C., secured a fall. The referee gave Angell first on aggressive work. Middle weight wrestling was won by Brunger of M. A. C., over Hurst, Alma, last year's Intercollegiate champion. In welter weight, Fryman, M. A. C., won from Moon of Alma. In the light weight contest Clark of M. A. C. and Hough of Alma tied, neither securing a fall. In special weight, Jennings of Alma won from Belknap of M. A. C. Belknap showed excellent form. This was his first contest but he gave Jennings, last year's champion, a tussle for his life. The feather weight wrestling was won by Burd of M. A. C. Each event had only two contestants save the shot-put, high jump and high dive. This made it difficult to secure accurate comparative scores since one or the other had to take second. Manning of M. A. C. secured the most points. He won 11 in all.

DETROIT BANQUET.

The second annual banquet of the Detroit M. A. C. Students' Association was held at Fellowcraft Hall, 7 p. m., March 12. The banquet was quite largely attended although the reception to Col. Hecker of the Panama Commission drew away several who had political aspirations. Attorney J. W. Beaumont, '82, president of the association, acted as toastmaster. H. C. Wyman with '69, F. A. Baker with '67, F. E. Robson '78, Miss Harriette Robson '00, G. G. Torrey with '61, Dr. F. T. Stephenson with '96, Prof. F. S. Kedzie '77, responded to toasts.

Dr. H. C. Wyman was elected president, E. I. Dail, secretary; Attorney Fred A. Baker, vice-president. About 60 were present and all had a pleasant time.

FARMERS' CLUB.

Prof. Shaw talked to the members of the Farmers' Club last Wednesday evening upon the subject of "Grading up Herds." The following are some of the facts brought out by him: The proportion of pedigreed to grade cattle in the United States is comparatively small there being one pedigreed animal to every forty-five unpedigreed. Out of the 324,000 head of cattle exported to Great Britain in the year 1902 the greater per cent. of them were grades and out of the 350,000 head of cattle exported in the same year but few pedigreed animals were found. This shows that we are dealing mostly with grade animals. At the present time the primary object for which we are raising pedigreed animals is the maintenance of quality and from a practical stand-

point it is impossible for the average farmer to go into the thoroughbred business to a very great extent especially in this State. As an illustration of this we can say with a fair degree of certainty that a very few students graduating from this institution can go home and sell all the grades and start with a pedigreed herd. The only thing for them to do, provided they are anxious to become a breeder of full bloods, is to practice the system of "upgrading." To do this they must first make up their minds as to the kind of blood that they are going to use and having done this they must stick to their purpose unerringly. They must not practice zigzag breeding, otherwise their herds will present the same appearance that too many of our Michigan herds already present, namely, scrubs and mixed breeding.

In the second place they should secure good thoroughbred males of the breed to be used. And it would be well to also secure one good thoroughbred female since the progeny will in time grow into a full blood herd and they will be stimulated by knowing that in time a herd of full blooded cattle will be in their possession. In breeding the development of uniformity in color, shape, size and quality should constantly be kept in mind. This is essential from the standpoint of appearance for an even bunch of cattle will sell better upon the market than an uneven one. The greater the mixture of different bloods in the base for upgrading the greater relatively will be the betterment when upgrading begins, but as nearness to perfectness of breed type is approached there will be less apparent improvement with each succeeding generation. It should be impressed upon a young breeder's mind that he should not start too deeply in a business which he knows but little about, but rather he should grow into that business. R. C. P.

Albert Moore, a special student in the Department of Forestry since Sept. 1902, was taken suddenly ill on Saturday evening, March 5, with acute peritonitis. He roomed in Lansing, and was removed to the city hospital, his brother, Dr. Norman Moore, being the attendant physician. The disease could not be controlled and he died early Tuesday morning, March 8. Mr. Moore was a very earnest and faithful student. His teachers speak highly of him. He was always ready to lend a helping hand and won the friendship of many by his genial ways. Mr. Moore was 19 years old. Two brothers and an uncle, Judge J. B. Moore, of the supreme court, reside in Lansing. His home was in Howard City, where the body was taken on Tuesday afternoon. The College community extends its sympathy to the bereaved family and friends.

Supt. E. C. Warriner of the Saginaw Public Schools, visited M. A. C. last Thursday. He inspected the shops with a view to secure ideas for the manual training work of the Saginaw schools.

ALUMNI.

'93.

The Smithsonian Institution has just published an advanced scientific monograph on fleas, by C. F. Baker. It is called "A Revision of American Siphonaptera, or Fleas, Together With a Complete List and Bibliograph of the Group, by Carl F. Baker, of Leland Stanford Junior University." In this treatise Mr. Baker not only makes an exhaustive study of this comparatively little known group of insects, upon which he is, perhaps, the foremost living authority, but he describes a large number of wholly new species. Besides this monograph Mr. Baker has done advanced work, in the field as well as in the laboratory, in both entomology and botany, his numbered collections being now known in most of the prominent universities, and museums of this country and Europe. He has collected in South and Central America and very widely throughout the deserts and mountains of our western country. He now occupies the chair of biology, at Pomona College in Southern California.

'95.

W. C. Stebbins, who teaches physics, chemistry and botany at Grand Forks, N. Dak., has learned the Russian language. It is not certain that he will join the Russian army, but he threatens to use the language in a vindictive way if some things happen again. "Stebby" is doing real well and will get an increase in salary if he chooses to stay next year.

'96.

B. A. Bowditch, of Pittsford, Mich., visited M. A. C. last Thursday. He conducts a general mercantile business and manages a farm. He keeps short horn cattle. Things are coming his way and he enjoys the work.

R. L. Clute is teaching in the Philippines. He can be addressed at Manila, in charge of the Educational Department. He says that the prospects in the Philippines are very encouraging.

'02.

Mr. Irving Gingrich, on his return from the annual meeting and exhibition of the American Carnation Society in Detroit, stopped at the College one day last week. The meeting was a success in every way, and Mr. Gingrich is a greater enthusiast in his chosen line than ever. The South Bend Floral Co., of which he is a member, cannot turn out stock fast enough to suit the customers and the demand for their product is increasing more rapidly than can be met. Mr. Gingrich is a skillful hybridist and has produced some seedlings which are doing exceedingly well as shown by photographs of both blooms and plants. His address is 804 E. Du-bail Ave., South Bend, Ind., and he is always glad to receive calls from M. A. C. men.

THE M. A. C. RECORD.

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TUESDAY, MAR. 15, 1904.

Y. M. C. A.

Mrs. Lawson, missionary from northern India, addressed a union meeting of the Y. W. and Y. M. C. A. Thursday evening in chapel. Mrs. Lawson spoke in the interests of an industrial missionary enterprise now being inaugurated in northern India. This gives employment to converts, who on accepting the gospel of Jesus Christ and being baptized are declared outcasts and aliens, by their own friends and relatives, and have their property confiscated, their business ruined and practically all means of a livelihood denied to them. Besides securing this end it will stimulate and educate the people to an intelligent and more satisfactory practice of agriculture, horticulture and related occupations. There are many ways in which industrial missionary work, like the medical missions, can be of great value to India. The meeting was very interesting and well attended.

Rev. R. C. Dodds, of Lansing, conducted chapel exercises Sunday morning. Text, John 12:32. Theme "The attractive power of Jesus Christ on the cross of calvary." The sermon was very interesting and replete with suggestions and thought.

Rev. Mr. Edwards addressed the union meeting of the Y. W. and Y. M. C. A. Sunday evening. Subject, "Conscientious Men." The address dealt with the conscience, what it is, how it works, how it may be dwarfed and narcotized, or how it may be developed and made more acute and delicately responsive.

The position and value of conscientiousness in life generally was discussed. Many valuable suggestions were made. H. N. H.

HORTICULTURAL CLUB.

Prof. J. A. Jeffery talked on Soils at the Horticultural Club last Wednesday evening.

He referred to a bulletin published in 1890 in which it was claimed that there are very few soils which do not contain sufficient K₂O and P₂O₅ to support plant growth for an indefinite length of time. By the use of tables of soil analysis and

fruit analysis he showed that there is in a common fruit soil, which had been cropped 40 years without manure, sufficient potash and phosphorous to grow fruits for hundreds of years. The problem is how to secure these elements. The solution of this problem is not so much for the soil physicist as for the bacteriologist. Wade of England says, "All transformation of all mineral matter into soluble condition must be brought about by biological processes." With agricultural plants the elements for plant growth are scarce within the root zone while just without they are abundant.

The Hitching's system of orcharding was discussed. Prof. Jeffery thinks as far as the fertilization of the soil is concerned it is a good method because the root system of the perennial grasses tunnel the soil deeper which permits a freer circulation of air, putting the soil in a more natural condition. Other factors as fungi and insect pests were not considered.

Prof. Hedrick showed and commented on three varieties of apples. The Crackson, a new sort from New York state, a nice, crisp, red apple with good flavor and a long keeper. The Western Baldwin, a seedling of our Baldwin, a fine, flat, red apple with good keeping qualities, an old variety but not well known in Michigan. The Carlough, a new sort, color yellowish, the best long keeping sweet apple we have.

At the next meeting of the club the president, Mr. Severance, will give his farewell address. Mr. Thomas Gunson will talk on markets.

All are invited to be present.

F. L.

ALUMNI.

'91.

Prof. H. W. Mumford of the University of Illinois, addressed the Illinois Live Stock Breeders' Association on Beef Cattle. His recent bulletin and the address received very favorable comment in a recent issue of the Drover's Journal. A copy of the bulletin has been placed in the library.

'99.

W. K. Brainerd has charge of the dairy department at the University of West Virginia. The Live Stock Breeders' Association recently visited the station and Prof. Brainerd gave a lecture on dairy conformation using the station herd as examples. He also spoke on "The Ideal Dairy Cow" before the Association. A State Dairy Association was organized and Prof. Brainerd was elected secretary-treasurer. West Virginia has neglected dairying for a long time and an earnest effort is being made to put it on a sound basis.

'00.

Married, Tuesday evening, March 8, H. B. Gunnison to Miss Margaret E. Sargeant. At home 182 Maybury Grand Ave., Detroit. THE RECORD extends congratulations.

'03.

G. C. Sevey has been promoted to the position of assistant editor of *The New England Homestead*, Springfield, Mass. He has worked for the Orange Judd Co. since last October and has passed editors on the staff who have been there from 6 to 10 years. He says that he is using every particle of training received at M. A. C. and could use

much that he lost. He has taken several excursions into the Berkshires and visited many an historic spot of Revolutionary days. If every alumnus would send in an item or two once in a while, the alumni columns of THE RECORD would be more interesting.

'03.

W. P. Snyder has been placed in charge of the North Platte Experiment Station. He will spend the summers at the station and teach in the University of Nebraska in the winter time. With the additional responsibility comes also an increase in salary. Good! Pass it around.

'02.

Last Tuesday evening Mr. T. G. Phillips favored the A. C. Foresters with an address on Forestry in Southern California. He told of the high value placed on trees by the people of the country south of the San Gabriel and San Bernardino mountains because their plantations are entirely dependent upon the water that falls upon the mountains to the north, and the retention of this water depends upon the soil cover. Non-irrigated land is sterile and barren, but with water the soil will grow anything adapted to the climate. On the south slope of the mountains only chaparral will grow, but toward the crest of the mountains the line of tree growth begins as abruptly as the standing grass next the stubble. The Sugar and Jeffrey Pine are the most valuable forest trees and grow from 150 to 200 feet high with proportionate diameter. Chaparral is a growth containing many species of oak, pine and other species, mostly evergreen, that acquire only a scrubby growth less than the height of a man. The California Legislature appropriated \$15,000 and the government an equal amount to carry on the investigation of the forestry conditions of this region.

The yearly precipitation among the orange groves is only 10 to 12 inches, while on the mountains it is nearly 90. The water that falls on the north side of the mountains would naturally run off and lose and waste itself in the sands of the Mahave Desert, but a viaduct is in course of construction that will bring this water back through the mountains in ditches and tunnels, one of the latter being over a mile long.

Mr. Phillips expressed a good deal of enthusiasm for the region as a place to live. He said that standing on the San Bernardino mountains one could see the highest point in the United States, Mount Whitney, 14,878 feet high, some 200 miles to the north, and Santa Cata-

lina island in the Pacific to the south.

He told of the enormous growth of the eucalyptus trees—fifty to sixty feet high in five years. They are planted in rows and after five years growth each alternate row is cut out for fuel, they having reached in that time a diameter of 6 to 10 inches. The sprouts, which spring from the stump, grow even faster than trees from seed.

Mr. Phillips delivered a similar lecture to the junior agricultural students in Forestry on Wednesday, illustrating both lectures with maps and specimens previously sent to the forestry department.

Mr. Phillips has resigned from the Forestry Department to engage in business for himself. He has become interested in 50,000 acres of cedar at Bogas Del Toros, Panama. The intention is to manufacture fruit boxes. Since entering the employ of the government, Mr. Phillips has traveled in 34 states. He thinks that the west offers many opportunities and he has learned that the power to do is of more value than the mere fact of knowing.

Mr. C. E. Swales is immunizing a rabbit to Asiatic cholera. The idea is to study the production of anti-toxic serum. The rabbit has been given a small dose of beef tea culture. This will be gradually increased until the animal can withstand a much larger dose than would originally produce fatal results. The anti-toxic property of the serum will then be determined.

A greenhouse, 20 feet square, model in every way and donated to the Horticultural Department by Lord and Burnham, of New York City, is being constructed on the south end of the Horticultural Laboratory. It will be used for laboratory work. The firm constructs greenhouses on a large scale and has donated this for exhibition purposes. The college will put in the foundation. Prof. Hedrick had the same firm build greenhouses for him in Oregon and in Utah.

The military hop of March 1 was a decided success. The attendance was the largest in the history of these events. Major and Mrs. Vernou and Major and Mrs. Kell led the grand march. Parreant's orchestra from Lansing furnished the music. Towards the middle of the evening the officers of the battalion lined up and Major Vernou was presented with a silver loving cup. Major Vernou has the respect and esteem of the entire student body and all wish him well. Prof. and Mrs. Weil and Prof. and Mrs. Brewer acted as chaperones.

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ABOUT THE CAMPUS.

The Librarian's office has been greatly improved by a new rug.

The Botanical Department has purchased a new Fox typewriter.

Instructor and Mrs. Longyear have been ill for several days with the grip.

Have you seen the geyser between the Library and the Bacteriological Laboratory?

Mrs. Babcock gave a farewell reception in honor of Mrs. Dean. Mr. and Mrs. Dean are due in St. Louis, Mo., today.

Dr. Beal says that the river is as high at present as he has ever seen it, in fact he thinks it is the highest in the history of his stay at M. A. C.

"M. A. C. graduates land on their feet as certainly, as skillfully, as comfortably as those of any other school in the land."—*Moderator-Topics*.

Each associate editor should at once report the name of the editor elected for the spring term. Sometimes these matters are neglected and cause considerable annoyance.

The cheese course closed last Thursday. The class numbered 26 and the work has been a success in every way. Most of them have positions and several calls are on file from different factories.

Prof. Taft left for St. Louis, Mo., on Thursday noon. He is to have a conference with Prof. F. W. Taylor, chief of the Horticultural Department of the exposition, regarding the work of the jury of awards.

The Michigan Flora is now ready for the printer. It will occupy about 170 pages in the fifth volume of the report of the State Academy of Science. A great many additions have been made.

The Hesperian Society elected the following officers for the spring term: Pres., G. N. Cardoza; Vice Pres., A. C. Dodge; Sec., C. M. Granger; Treas., W. P. Wilson; Marshal, W. H. Bidwell.

A new case will be put in the Botanical Laboratory for fungi; another one will accommodate the stage microscopes. So far it has been difficult to keep these instruments intact. Parts get lost and no one can be held responsible.

The officers selected by the Union Literary Society for the spring term are: Charles Woodbury, President; Horace S. Hunt, Vice President; H. C. Salisbury, Secretary; Earl Kenrick, Treasurer; Ray G. Potts, Marshal.

The board in the clubs for the winter term is as follows: Club A, \$2.25; Club B, \$2.55; Club C, \$1.70; Club D, \$2.35; Club E, \$2.40; Club G, \$2.00; Club H, \$2.12. The average cost has increased about 5 cents per week over the fall term.

The Grand Traverse Dairymen's Association will hold its fourth annual meeting at Traverse City, Mich., March 16 and 17. Prof. Smith will talk on "Fact and Fancy in the Dairy Farm." R. E. Doolittle, '96, is to discuss the milk question from the standpoint of the con-

sumer. E. O. Ladd, '78, has winter dairying. Hon. F. M. Warner, with '84, is to be present as well as other prominent dairymen.

The officers of the Sigma Mu Beta L. S. for the spring term are as follows: A. B. Rogers, President; H. H. Yarrington, Vice President; H. C. Oven, Secretary; E. F. Smith, Treasurer; L. B. Westerman, Marshal; M. J. Dorsey, Warden; Chas. A. Willets, RECORD Editor.

The Kalamazoo orator at Adrian had just recovered from a severe illness, and on this account was unable to finish his oration. M. A. C. extends its sympathies. THE RECORD does not wish to cast reflections on the contestant, but must criticize the judge. If a contestant drops out, that is all there is to it so far as the judges are concerned.

The Boarding Club Association will not engage a manager for the present. The stewards will do all in their power to unify the purchasing of material. For example, one will take charge of the meat supply for all the clubs, another of vegetables, etc. It is calculated that this method will result in saving considerable money to the clubs.

Chas. E. Hoyt, instructor in the foundry and wood shop at M. A. C. from '95 to '97, and now in charge of foundry work in the Lewis Institute, is to be married to Miss Helen Gertrude Kellogg on March 23. The wedding will take place at the home of Prof. P. B. Woodworth, 5808 Ohio St., Chicago. Congratulations.

Messrs. Hahn and Geller are working on Bulletin 22 of the U. S. Department of Agriculture. The idea is to see whether water passed through soil will have a constant percentage of elements. Five kinds of soils are being tested. The water is first distilled and then run through the soil. A chemical analysis follows.

Some of the Seniors in bacteriology are doing work along the line of meat curing. Corning of beef, processes in making dried beef, brine salting of pork, dry salting of mess pork, and dry salting of hams and shoulders are some of the subjects considered. The action of these salt solutions on meat and on bacteria is carefully worked out. The class in general is studying the influence of light, heat, cold, filtration and electricity on micro-organisms.

B. T. Galloway, Chief of Bureau of Plant Industry, Washington, D. C., says that the M. A. C. Botanic Garden is the best he ever saw. He wants one just like it, only larger, for economic plants. Prof. Duggar of the Botanical Department of the University of Missouri, has asked for photographs of the garden. 25 have been sent. He said that Prof. Galloway had recommended the garden very highly. Missouri expects to put in a garden similar to the one at M. A. C. Botanic gardens are not very numerous. Harvard has the oldest. The disappearance of the wild plants makes a garden a necessity for the colleges who do extensive work in Botany.

Ye editor lectured at Stevensville last Friday evening and addressed the high school during the afternoon.

Alma will come to M. A. C. next term for a dual meet. Olivet will also be here and either Albion or Ypsilanti.

Miss Winnifred Knott, formerly stenographer in the Mechanical Department, was recently married to Mr. Warfield, of Lansing.

Eddie Pinnance, the Indian ball wonder from Walpole Island has signed with Connie Mack's Philadelphia American League team and left for Philadelphia on Thursday. —*New Baltimore Era*, March 3.

F. Tenkonohy has left for his home in Detroit. He is under the care of Dr. Stephenson and Dr. Walker will operate on his knee which was injured by falling on the icy walks. An X-ray photograph showed a fracture of the end of the femur.

The Freshmen won from the Juniors in Basketball last Saturday with a score of 21 to 8. This gives the Freshmen the inter-class championship. The Freshmen deserve the honor. They have worked hard. It was a case of work vs. reputation, and work won.

W. L. Watling, of Chicago, has presented the Chemical Department with a collection of 14 different materials used in the manufacture of commercial fertilizers. He sent a description of each article. These materials are hard to secure and the descriptions are very interesting.

Some criticism has been made on an editorial regarding expenses at M. A. C. Ye editor is well aware of the fact that some students have difficulty in keeping expenses down. Some men will go down town and spend \$5, while others need \$25 before returning home. It is the same with students at college. There is enough money absolutely wasted in every institution of learning to pay the necessary expenses of 25 per cent of the student body. Some Harvard students spend \$2,000 per year while others spend less than that amount during their entire course. So it goes. It is largely a matter of the individual.

Under the auspices of M. A. C., the methods of live stock judging employed at the college will be illustrated during three afternoons of the State Fair week. This work will be conducted by members of the college staff and both graduates and undergraduate students. In presenting this work the methods of horse, cattle, sheep and swine judging as used in the classroom will be presented. This is intended to bring the college into closer touch with the live stock breeders of the state and to give prospective students an opportunity to personally inspect the methods of instruction employed.

The section of Sanitary Science of the Michigan Academy of Science will have 23 articles on its program. Dr. Marshall has The Associative Action of Bacteria in the Souring of Milk. Domestic Science in Its Relation to Sanitary Science will be handled by Miss Lyford. Miss Carpenter will discuss The Object of Cookery in Schools. Iron and Fibre in Their Relation to the Food of Man is the subject of F. W. Robinson's address. Dr. Beal has charge of the Agricultural section, Mr. Longyear of the botanical, Dr. Marshall of the Sanitary and Mr. Pettit

of the section of zoology. M. A. C. certainly has her share.

Mrs. J. C. Lawson, a missionary from India, visited M. A. C. last week Thursday. India has over 300,000,000 people, 220,000,000 of which belong to the white race. That is they are descendants of Japhet. The mission is located about 110 miles north of Lucknow. The idea is to teach industrial work along with Christianity. Rev. and Mrs. J. C. Lawson have lived in India for more than 20 years. India has more than 330,000,000 gods. When a Hindoo becomes a Christian he loses his job and becomes a vagabond. Hence, the necessity of teaching farming, gardening, dairying and manufacturing.

The question of self-government for colleges was debated at the debating club last Thursday evening by Messrs. J. P. Knickerbocker and C. E. Sivalis as affirmative speakers and A. C. Dodge and M. W. Taber as negative. Many an "interesting" time in the history of our college was brought to our attention with a view of illustrating the course often pursued by college students. Also the power of self government was cited as an educating factor in colleges for better citizenship. The merits and demerits of each over the other were also argued. The decision of the judges was two to one for negative. The question for debate at the next meeting is: *Resolved*, That there should be a limit on the amount of money which any individual may accumulate.

Prof. U. P. Hedrick has issued a bulletin on the apple. The apple is the sovereign fruit of America. About 50,000,000 barrels are produced annually. Michigan has fallen behind in the production of apples chiefly because the soil has been robbed of its fertility. Fertilizers must be added, such as manure, ashes and nitrate of soda, superphosphates and ground bone. The orchard should be cultivated in order to furnish oxygen to the roots and allow bacteria to live and work. Insects and fungi have increased because man has destroyed the natural food of many pests. The trees should be sprayed before the buds start in the spring, with copper sulphate solution. Spray with Bordeaux mixture and Paris green just before blossoming. Repeat this within a week after the blossoms fall. If conditions seem to demand it, spray again two weeks later. Lastly, spray again the last of July or the first of August. Pruning, improvement and selection of varieties receive due attention. Spitzenburg, Yellow Newton, Pippin, Grime's Golden, Northern Spy, Greening, Swaar, Jonathan and King are mentioned as excellent winter varieties. 42 suggestive questions conclude the bulletin. The pamphlet cannot fail to arouse interest in "The Fruit of Fruits."



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