The State Agricultural College

EXPERIMENT STATION.

BULLETIN NO. 5.

REPORT OF

EXPERIMENTS IN APIARY.

1887.

FORT COLLINS, COLORADO.

OCTOBER, 1888.

The Courier Print, Fort Collins.

BULLETIN NO. 5.

EXPLANATORY.

The material in this bulletin was ordered printed by the State Board of Agriculture at its December meeting, 1887; and in connection with this it was thought best to make a general announcement with reference to the work of the Experiment Station.

The departments now recognized and organized as the Experiment Station are:

1. Agriculture.
2. Horticulture, Botany and Entomology.
3. Chemistry.
4. Meteorology and Irrigation Engineering.
5. Veterinary Science.

These Sections, wishing to give information or direction with reference to their work, have each prepared a brief circular.

The public in their communication with the Station with reference to work or information, will please be guided by these circulars.

Bulletins will be issued at least quarterly, corresponding to the months of October, January, April and July.

If there be matter of special importance, it will be issued at once, without waiting for the regular quarterly issue.

Address all correspondence to

THE AGRICULTURAL EXPERIMENT STATION,
Fort Collins, Colorado.

The Agricultural Section.

To all applicants for seed the Station is now prepared to send in small quantities, all kinds of spring and winter wheats, oats and barley; also corn, buckwheat, rye and other farm and field seeds, such as beans, beets, peas, broom-corn, pumpkins, squashes, flax, hemp, canary seed, millet — German, French and American — sunflower, lupins, lentils, vetches, milo maize, dourra, speltz, red clover in quantity, alfalfa, sorghum, kaffir corn and fenugreek.

These seeds have been very carefully improved for some years on the College farm, and are true to name and genuine so far as it is possible to make them.

With all who receive these seeds, correspondence is solicited, and reports asked for as to the manner of seeding, culture, production, success and failure, and causes of same, adaptability to soil and climate, and their yield.

In connection with this, such questions as the following might be reported, viz: Thick and thin seeding, deep and shallow planting, hill and flat culture, time of planting and irrigation, irrigation by flooding and in furrows, amount of water applied and number of irrigations during the season, and fertilizers, if any, used. Also, comparative value for feeding purposes of the clovers, tame and wild grasses, corn fodder, value of field peas, pumpkins, squashes, beets, turnips and other forage and root plants.

All distributions of seeds are made through the Hon. Frank J. Annis, Secretary of the State Board of Agriculture, to whom all applications should be made. This Section would be pleased to receive from any source, available samples of new varieties of seeds to grow, by way of trial and comparison.

Section of Botany, Horticulture and Entomology.

DIRECTIONS FOR SENDING SAMPLES OF SEEDS AND SPECIMENS OF PLANTS AND INSECTS.

Sound seed true to name, and free from the germs of noxious weeds, is essential to successful agriculture.

The germinating value of farm and garden seeds is determined by the examination and testing of a small average sample.

This the Experiment Station is now prepared to do, free of charge, for the farmers and gardeners of the State, subject to the following conditions.

1. Of small seeds, such as grass and clover seed, send two ounces; of cabbage, beet or turnip seed, four ounces; and of the larger seeds, as of wheat, peas and other legumes, eight ounces.

2. Samples may be sent by mail or express, prepaid, in stout paper bags, with the sender's name plainly written thereon, and should fairly represent the whole amount from which it was taken.

3. A letter of advice should accompany the package, giving the name of the variety sent, from whom purchased, by whom, and in what year grown, and whatever else may be deemed of value by the sender.

4. A record will be kept of all examinations made, and a report mailed to the sender.

Seeds should be forwarded some time before needed, as it takes time to complete the tests.

SENDING INSECTS FOR NAME.

The larvae (worms, caterpillars, etc.) of insects, should be sent in a tight tin or wooden box containing a good supply of their appropriate food plant.

Specimens, if dead, should be packed in cotton or wool, inclosed in a stout box.

The wings of butterflies and moths should be handled as little as possible, that their peculiar markings may be

the better preserved, and the species more readily determined.

Send as full an account as possible of the habit of the insects about which you desire information.

In sending pinned specimens of insects, always secure them safely in a box, to be inclosed within a larger box, the space between the two to be packed with cotton, to prevent too violent jarring.

SENDING PLANTS FOR NAME.

Plants may be sent by mail, placed between sheets of thin paper, and protected with stout card board; or, they may be wrapped in moist paper or moss, and sent in a stout paper box.

Small plants should be sent entire, including the root, flowers and fruit; of larger plants, send a portion of the stem with its leaves, flowers and fruit.

In writing, state the character of the soil on which the plant grew, and whether it is moist, wet or otherwise.

Section of Meteorology and Irrigation Engineering.

This Section wishes to study Meteorology principally from the standpoint of agriculture, and will, therefore, pay more especial attention to those observations which are of influence on, or throw light upon, the laws of plant growth.

Among the observations which can be easily made, and which give valuable results for the labor expended, are those on the rainfall. A fair idea of the amount of rain falling in a shower may be obtained by putting out a vessel with vertical sides—as the ordinary two-quart pail, or a tin fruit can—and measuring the rain after the shower. But when the rainfall is slight, such measurement is difficult to make directly. In instruments made directly for the purpose, the rain is conducted to a smaller vessel,

whose area is one-tenth of the collecting vessel. Thus a rain of one-tenth inch will stand one inch deep in the measuring vessel. By this means a small fall may be accurately measured.

The rain gauge adopted by the U. S. Signal Service consists of a circular funnel-shaped collector, eight inches in diameter, which discharges into the measuring vessel 2.53 inches in diameter. This latter has then an area one-tenth of that of the collecting vessel. The measuring vessel is some over twenty inches in length. At the exact height of twenty inches an overflow notch is cut, and in order to catch the overflow, if the fall should exceed two inches, the whole is placed in a second vessel six inches in diameter.

Gauges like this could be made from tin by a careful tinsmith, and painted, and would give satisfactory results. They may be purchased for a small sum.

In placing rain gauges, care needs to be taken that they be placed on a level surface, as far as possible from trees or buildings, or anything that would interfere with the free access of the rain, or cause eddies in the air currents. The distance from a tree or other obstruction should be twice its height.

The gauge should be from six to eighteen inches above the ground.

Rain observations may be taken with very little trouble or expense, and this Section invites co-operation and correspondence from all who are willing to undertake them. Stations are desired on the plains and in the mountains, especially toward the headwaters of the principal streams furnishing water for irrigation.

Among data which can be furnished without instruments, are the data of first and last frosts, times of planting, blossoming of the various crops, dates of blossoming of common plants, etc. All observations of this kind are invited. Such data will be preserved with

proper credit, and will form a valuable storehouse of information as observations increase.

Correspondence is invited on topics connected with irrigation engineering, and data regarding irrigation is requested; description and plans of ditch, measuring flumes, headgates, etc., whether peculiar to your locality or not; means taken to economize water or to increase the duty; of trials in sub-irrigation; of attempts at reclaiming alkali lands by drainage or otherwise; of reservoirs, especially any data that bear upon the loss of water by evaporation or seepage, or both; of the effect of irrigation upon the soil; height of the water table before and since irrigation, etc. All such data, or any other bearing upon the irrigation system of our State, is asked for, and such information as is furnished will be at the service of the citizens of the State.

Veterinary Department.

Experiments to determine the cause, nature, symptoms and post-mortem appearances of the so-called loco disease in this State, are about to be commenced at the Experiment Station.

Answers to the following questions are requested from all who have suffered loss from this disease, and who have had personal experience of the affection.

1. When was the disease first observed to affect your animals, and at what season of the year?

2. What symptoms are observed, and how long does the disease last, on an average?

3. How many animals have you lost from the loco disease?

4. How many animals have you now sick from this disease?

5. What is your opinion as to the cause of the disease?

REPORT ON APIARY.

1887.

(NOTE.—The following report of the Apiary Section of the Horticultural Department was an experiment, only in the sense that every line of work on which accurate and full notes are taken, is an experiment. The Board of Agriculture, deeming the history of the work, and development in the Apiary that year, of prime importance and interest, desired to place it before the people in a bulletin. The report was prepared by C. Max Brose, Assistant Horticulturist, in charge, and read before the Board December 14, 1887.)

Took charge of the bees April 10, 1887, and found two swarms, out of eight stands, alive; one was fair, and the other a very weak swarm. The weather being backward, the willows did not bloom until the latter part of the month, when the bees commenced to gather pollen; then, as the maple began to open here on the grounds, the bees were very active, and the queens commenced laying. The strongest swarm was doing fairly well, but the weak one dwindled badly. Being in hives of two different patterns, we had no chance to strengthen the weak one by giving it a frame of brood from the stronger one.

May 10, we adopted the Simplicity hive, and ordered stuff for new hives, and also comb foundation for brood chamber. The bees commenced working on apple bloom, but there being several frosty nights, destroyed the same, and gave the bees a severe check in consequence. By some mistake in the shipping, the hives ordered were delayed on the road, and did not arrive here until June 5.

June 6, united the two swarms, and transferred the same to a new hive, finding some drone brood. The transferring gave the bees another check, but they soon com-

menced to work again on the raspberry. We fed all the honey we found in the old stands, which stimulated the queen and bees, so that by the 10th of June there were six frames full of brood, and we felt safe to start our nuclei.

A nucleus is a small hive holding two or three frames, in which you rear young queens. We started two, taking from the old hive two frames full of brood and fresh-laid eggs, with all the bees adhering to them. Each frame was placed in a nucleus with two frames of empty comb; we also replaced the two frames taken from the old hive, with two frames of empty worker comb.

If a swarm of bees lose their queen at any time of year when there are fresh-laid eggs in the comb, less than three days old, the bees will at once procced to supply themselves with a new queen; this they do by constructing a number of queen cells, sometimes as many as twenty, generally from five to twelve; in each they place a worker egg or larva, and feed it on what is called "royal jelly." This egg, if left in a worker cell, and fed upon worker food, would have grown to be a worker bee; but with the royal jelly as food, develops into a queen. In eight days from the laying of the egg, the bees seal up her cell to allow her to undergo the final transformation. On the sixteenth day from the egg, the queen is full grown, and if left undisturbed will hatch a perfect queen. The best way is, to take the queen away from an old swarm of bees, and after they have started their queen cells and have them sealed over, to cut the same out and insert these into the comb of the nucleus; but, having only one swarm to start with, we could not do this without destroying our chance for increase.

The morning after the nuclei were started, there were several queen cells in progress of construction.

June 20, started another nucleus in the same manner, only cut a queen cell out of one of our first nuclei, and inserted the same into the comb of the new one, so that on June 20, we had three nuclei with virgin queens.

In from two to five days the young queen will take her bridal flight, after which she returns to her hive and commences laying eggs within two or three days.

A young, vigorous queen will lay from 2,000 to 3,000 eggs every twenty-four hours, during the season of a good honey flow.

On the 30th of June, we found fresh-laid eggs in one of the nuclei. The old swarm, by this time, had gained in strength. The queen, being a good layer, had nearly all the combs filled with eggs and brood in all stages of maturity, so that we felt safe to make a new swarm; this was done on the first day of July, in the following manner: About noon, when the bees were flying heavy, we moved the old swarm about ten feet away, took the nucleus which had a laying queen, transferring the same, with bees and comb, into a new hive, and filling in with frames in which had been placed comb foundation. This was placed on the same stand where the old swarm had been; all the bees returning from the field went back to their old stand, but into the new hive, took to their new queen kindly, and by night we had a good swarm, with a laying queen.

On the second day of July, we found fresh-laid eggs in the other nucleus, but had to wait at least eight days before we could make another new swarm, which we did on the 10th day of July, as before.

By this time clover commenced to bloom, and the bees were doing their best. We found the young queens good and vigorous layers, so that by the twentieth day of July we made another swarm from our first young one, in the same manner as before; we also started two more nuclei, which had laying queens by the 10th of August. We also killed the queen in the original hive, for we did not know her age, and inserted a queen cell.

The three young swarms by this time had done exceptionally well. The brood chambers were full of bees, brood and honey, and the upper stories nearly filled, so that by the

20th of August we made two more swarms; this we did by giving the nucleus three or four frames of brood out of the four hives, and also by filling in with frames full of honey from their upper stories, so that we then had six strong swarms, besides sixty pounds of comb honey, which would make an account showing as follows:

The original swarm		$10 00
To 5 hives, at $2.50		12 50
To 5 lbs comb foundation, at 50 cents		2 50
		$25 00

CONTRA.

By original swarm	$10 00	
By 5 new swarms, at $10.00	50 00	
By 60 lbs comb honey, at 15 cents	9 00	
	$69 00	Balance, $44 00

This account, as you see, shows a net profit of $44.00. Of course, we did not work our bees for honey, having only one swarm with which to start. Our object was to increase the number of swarms of bees.

Later on, I fed the bees what surplus honey we had after the frost stopped the honey flow, which kept the bees busy until late. The queen kept laying, and went into winter quarters with plenty of young bees.

We put the bees into winter quarters October 15, in the following manner: The hives were left on their summer stands, about four inches from the ground. We filled the upper story with chaff, to absorb the moisture which always generates in the hive during the winter, and banked the hives with dirt all around, closing the entrance so that only one or two bees could come out at a time. A better way is to have a double-walled hive filled in with chaff all around, as this serves to absorb all moisture, while forming a warm and equable protection for the bees during sudden changes of temperature during the winter.