

THE HEN AND THE ORANGE WORKING TOGETHER

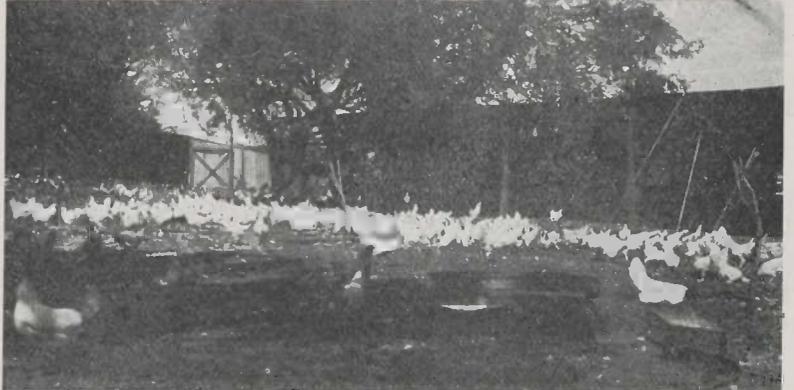
C. A. CATLIN, '27

Results of Experiments at the University of Arizona—The Value in Dollars and Cents—A Combination that Will Work

THE problem of keeping up soil fertility is becoming one of great concern to farmers of the Southwest, and most of all to the citrus growers. The need of a source of cheap fertility has resulted in diversification and crop rotation. Many of these practices are proving successful in areas where land is still of moderate value. In the areas where citrus may be grown, the land values prohibit the practices of diversification which require very extensive areas.

In citrus we find the methods of fertilization grouped under three heads: Green-manuring which may be practiced where irrigation or rain water is available in sufficient amounts and at the proper times to enable the turning under of the crop. In animal manures is a second source which may be obtained from diversification or by buying of the manures from stables or feed lots. Most animal manures must be shipped into citrus areas as the land values prevent stock raising in these districts. Closely allied with this practice is the use of commercial mixtures of prepared plant foods. A third field for obtaining fertilizers is that of using straws, spoiled hays, or forms of nitrogenous roughage. Examples of this method are found in the use of spoiled alfalfa hay and bean straw.

Many efforts have been made to find a system of operation or branch of farming, which might be combined with citriculture to aid in keeping up fertility, and still not effect the economic conditions of the citrus belt, by the using of too great an area for the added system. Poultry has been tried in places with seemingly satisfactory results. In this report I have



A good combination for two men is 10 acres of citrus and 3000 chickens.

collected available information on the subject and have from this data determined the value of poultry as a source of fertility for citrus. The subject was studied from the side of the commercial producer as far as possible.

The determination of the annual weight of droppings per bird was obtained in two ways. A pen of 25 healthy, mature and laying pullets was selected. The weights of the droppings on the dropping-boards were taken every week for seven weeks. From the average of these weights was calculated the annual weight of night droppings. This multiplied by two gave 28 pounds, the yearly (24 hours per day) weight of the droppings voided per bird. The second method was the taking of results of other experiments of a similar nature. The average, 33 pounds per bird per year, was the weight used in the calculations later in the problem.

It was found that the weight of droppings determined by different men varied greatly. The maximum and minimum being about fifty

pounds to twenty-one pounds as showed in the above table No. 1.

The next question which appeared was that of the value of these voidings as a fertilizer. Chemical analysis shows the composition to be high in the element needed for citrus fertilization, namely nitrogen. Experiments on the application of nitrogen to citrus orchards has proved the need of this element. The health, vigor, and productivity of the trees are greatly affected by nitrogen fertilization. From the analysis we may conclude poultry droppings to be classed as a concentrated manure of high fertilizing value to citrus. This also reminds us that too heavy an application is worse than none at all because after 350 pounds of N₂ is added to citrus a burning takes place which will cause a permanent injury and perhaps death.

Knowing that poultry voidings are very concentrated nitrogen manures we find that rapid loss of the N₂ by fermentation will readily take place. To prevent this loss several methods are practiced. Some men sprinkle gypsum over the dropping-boards and the storage pile. It has been suggested that the storage pile should be kept dry and protected from rain, sun, and intense heat to slow up chemical activity. Another method of retaining the nitrogen value is to add an absorbent to the droppings. One formula for this addition is to 10 pounds of droppings, add 4 pounds of muck or sawdust, 4 pounds of acid phosphate, and 2 pounds of Kainit. A more simple mixture is to add road dust, muck, sawdust, Kainit, or land

(Continued on Page 12.)

Table No. 1

Weight of Droppings—Pen No. 111 of 25 Leghorn Pullets			
Date	Total Wt.	Av. per Bird in lbs.	Remarks
Nov. 5-12, 1926	6.5	6.5 ÷ 25 = .26	Good weather
Nov. 12-19, 1926	7.0	7.0 ÷ 25 = .28	" "
Nov. 19-26, 1926	6.25	6.25 ÷ 25 = .25	" "
Nov. 26-Dec. 3, 1926	6.25	6.25 ÷ 25 = .25	" "
Dec. 3-10, 1926	10.62	10.62 ÷ 25 = .42	Rain and bad weather
Dec. 10-17, 1926	10.62	10.62 ÷ 25 = .42	" " " "
Reference	Wt. per Yr. per Bird	Remarks	
Mich. Cir. 25	31	100 birds gave 311 annually	
Hodgson—Calif.	42 (35-50)	Depends on litter	
Maine Bul. 216	38 (30-45)	Average per hen year = 30 lbs. night	
Wheeler—N. Y.	35 (30-40)	Believes varies with feeds	
Purdue Bul. 182	21	Leghorns—21 lbs. night droppings	
Van Slyke	42	100 lbs. live weight—23 lbs. per day voiding	
Average	33	Used in calculations	

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Continued from page 5)

plaster enough to absorb all liquids and seal the mixture in tight containers. Still another method using a liquid tank and equipment for applying the fertilizer in a liquid form might be worked out. This method is used in connection with dairies at present with success. The droppings even if treated should be placed on the soil and worked in as soon as possible.

The response of citrus to fertilization has been studied for many years. Some of the latest and most extensive of these works were those in California conducted at the Arlington project. The Farm Bureau Surveys and State Reports all agree that citrus needs nitrogen in order to give the best possible results. The application needed is found to vary with the soil, climate, age of orchard, cultivation,

and irrigation practices, and the type of fertilizer used.

The number of poultry needed per acre might also be reduced with beneficial results by the application of part of the nitrogen in a venetative form. This might be worked out by a system of cover-cropping or by the addition of bean straw or spoiled alfalfa hay. The major part of the nitrogen would be added by means of the droppings.

The organic matter may also be increased by putting straw or hay in the pens and houses. This litter will catch the droppings and both droppings and litter can be applied and worked into the soil. The applications of this kind will aid in keeping the physical condition of the soil in good shape.

It has been found that more benefit is derived from a given amount of N₂ in animal fertilizers, such as poultry voidings, than is received from that in different commercial mixtures. This difference is thought to be due

to the availability of the nitrogen and also to some property present in animal derived fertilizers which has not been discovered.

From the data given it was determined that an application of from two hundred to three hundred pounds of nitrogen per acre would be the best practical application to use under commercial conditions of production.

From the data collected we may determine the number of poultry required to keep up the fertility of an average of droppings in one year and two per cent of this by weight is nitrogen we have .66 pounds of nitrogen per bird voided yearly. It was found that an application of 100 pounds of N₂ per acre kept up fertility with a yield equal to that of the average of fifty California Producing Orchards. This application of 100 pounds divided by .66 or the nit-

(Continued on page 13)

A

Hooks in the coat closet at the right heights for the different children of the family help train them to hang up their own things.

A

It is the nature of things for one who has failed in a little job to believe he was cut out for bigger things.—Marcus O'Ralius in Motor Chat.

Authors

Their Conclusions

Hodgson	Two birds per tree sufficient.
Sherwood	Knows droppings ferment loose N ₂ .
Van Slyde	Best not to use droppings pure, burn. Add 2-4 tons per acre.
Hodgson	10 A.—1000 birds per covers ½ A. 2 lbs.-3 lbs. of N ₂ per tree per year best.

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(Continued from page 12)

rogen produced or voided by a bird in a year equals 152 or the birds required to keep up the fertility of an acre for one year. By the same method it was found that for the best yields possible, under practices which would not injure the trees, an application of 200 pounds of N₂ required 304 birds and 250 pounds required 380 birds and for the maximum commercial application of 300 pounds of N₂, 456 birds are sufficient. Heavier applications cause damage to the trees so should not be attempted.

The results obtained in this problem were slightly higher than those made by other workers along the same lines. Hodgson of California concluded that 200 birds per acre was sufficient and suggested that one hundred would serve to maintain the fertility for low yields. Playing on the safe side with three hundred birds per acre, which I believe would be about the average required number for good results, a unit of 3000 birds would keep ten acres fertilized. One man with proper equipment should be able to handle from 2500 to 3000 chickens. Therefore the ten acre unit of 3000 birds would keep one man busy and the eggs should bring in a good labor

income for the man handling the flock.

Ten acres is considered a single man orchard. If this is true, what combination could be better for two men than a ten acre citrus grove with a 3000-bird poultry plant to furnish fertilizer. The division of labor would be such that the men could help each other at rush times so that very little

extra help would be necessary.

I believe the settlement of the fertility problem, in areas of high priced lands and crops will have poultry playing an important part. With 300 birds per acre for citrus a yield above the average should be possible at practically no cost to the grower for his fertilizer and maintenance of fertility.

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