SPECIAL ARTICLES

MEALY BUGS ON THE ROOTS AND NODULES OF LEGUMES GROWING IN THE FIELD

BESIDES furnishing the plant on which they occur with nitrogen from the air, the bacterial nodules of legumes are a potential food supply for the organisms of the soil. When the plant begins to decline, the nodule does also and from this time invading organisms, principally the bacteria of decay and fungi, play an important part in their disintegration. In some instances, however, the nodules are attacked while in full vigor, the destruction depending mainly on the presence of certain insects or organisms which utilize the tubercles of certain leguminous plants as food. McConnell,[1] Leonard and Turner,[2] have conducted experiments on the destruction of nodules by the bean leaf beetle larvæ, *Ceratoma trifurcata.* Forst., and McConnell[3] has described another insect found feeding on the nodules of wild legumes.

For a number of years observations have been made on root nodules of various legumes grown on the United States Department of Agriculture Experimental Farm, Rosslyn, Virginia, and in the vicinity of Washington, D. C., but previous to the season of 1919 the presence of mealy bugs on annual legumes in the field was not noted, although a species was found to some extent in the Agricultural Department greenhouses in Washington, D. C. In the field, the insects were usually found on the underground parts of the plant and not once were they observed on the foliage. As high as fifteen mealy bugs have been seen on one soybean nodule. While the insects were also noticed on the roots of the soybean, *Soja max,* Piper, navy bean, *Phaseolus vulgaris,* L., Japan clover, *Lespedeza striata* (Thunb.) H. and A. and chickpea, *Cicer arietinum,* L., the position in which they were generally found indicated a preference for nodules on all except red clover, *Trifolium pratense* L., where they were found in the greatest number on the tap root. Infestations have also been observed on the soybean at points near Washington, D. C., in Maryland and West Virginia, in sufficient number to indicate that the insects are widely distributed in this section.

The mealy bugs which were found on legumes grown in the field in Virginia have been identified[4] as the same species which has recently been discovered in the Arlington Farm greenhouse on potted plants. The species of mealy bug which was found in Maryland is closely related to the one found in Virginia.

The name of this insect is *Pseudococcus maratinus* (Ehrh.) which on the Pacific coast is much more commonly called *Pseudococcus Bakeri,* Essig. Mealy bugs of this species are widely distributed on the Atlantic and Pacific coasts and infest the roots and tops of a large variety of plants. The list of reported host plants includes few annual and biennial legumes: infestations by *Pseudococcus trifolii* Forbes,[5] on red clover, *Trifolium pratense* have been noted from Delaware, Illinois, Indiana, Iowa, Kentucky, Michigan, New Jersey and New York, and on white clover, *Trifolium repens* from Illinois, infestations by *Pseudococcus Bakeri* on lima bean, *Phaseolus lunatus* and by *Pseudococcus citrophilus,* Claussen MSS., on sweet clover, *Melilotus alba,* have been reported from California.[6]

As these observations were incidental to other work the only control plants were those which missed natural infestation. Judging from superficial appearances, there was no difference between the infested and uninfested plants. This is a point, however, which can only be

[1] McConnell, W. R., "A unique type of insect injury," *Jour. Econ. Ent.,* 8: 261-267, 1915.

[2] Leonard, Lewis T., and Turner, C. F., "Influence of *Ceratoma trifurcata* on the nitrogen gathering functions of the cowpea," *Jour. Am. Soc. Agron,* Vol. 10, No. 6, 1918.

[3] McConnell, W. R., "Another nodule destroying beetle," *Jour. Econ. Ent.,* 8: 551, 1915.

[4] Identification of insects and information concerning distribution and general habits kindly furnished by Mr. Harold Morrison, of the United States Department of Agriculture, Bureau of Entomology.

[5] Folsom, J. W., "The insect pests of clover and alfalfa," University of Illinois Agricultural Experiment Station *Bulletin,* 134, p. 190, 1909.

[6] Claussen, C. P., California Agricultural Experiment Station *Bulletin,* 258, 1915.

checked by carefully controlled experiments. Folsom[5] has stated that *Pseudococcus trifolii* will kill clover plants. The possibility of mealy bugs becoming a menace to the nitrogen-fixing functions of some of our common economic legumes leads to the belief that a wider and more thorough investigation of this question should be made.

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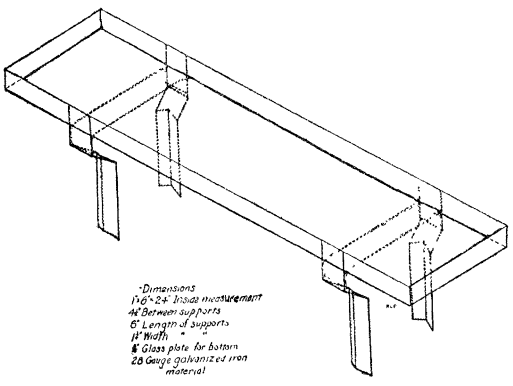
A HISTOLOGICAL SLIDE DRYING PLATE

EXPERIMENTING with a piece of plate glass balanced on top of a steam radiator as a drying plate for histological slides and having this knocked onto the floor and broken is rather disappointing. As a consequence the following piece of apparatus was devised and manufactured.

This slide drying plate is after the fashion of a shallow oblong pan with legs or supports to fit over the coils of a steam radiator. Galvanized sheet iron of number 28 gauge is the material used. The dimensions are as follows: long shallow pan twenty-four by six inches and one inch deep, inside measurement. To the sides of the pan are fastened the supports which fit over the radiator.

These supports are made of the same material as the pan and are one and one fourth inches wide by six inches long. They are fastened to the sides of the pan and to a strip of metal the same width (one and one fourth inches) which goes down the sides and across the bottom of the pan. These are riveted and soldered to the pan. The lower extremities of the supports are bent in the center line to fit more closely to the coils of the radiator for support. The edges of the pan and the legs are turned over five sixteenths of an inch to do away with sharp and rough edges (plate 1).



The pan is one inch deep in order that a glass plate may be fitted to make a smooth and level surface at the bottom below the rim of the pan. The rim or sides of the pan are to hold the slides in place. Five sixteenths of any inch plate glass is used. This is a means of tempering or evenly distributing the heat to all parts of the plate. It does not require much time to heat and retains the heat. Tests showed that the variations in temperature of the center and the sides were only one or two degrees Centigrade.

This slide drying plate does not get too hot for all ordinary drying purposes. Tests which were made averaged the following degrees of temperature with the room temperature between 21°-24° C. or 70°-75° F.

Centigrade	Fahrenheit
45°-55°	113°-131°

The capacity of this plate is forty-six slides.

The advantage of this as used with a steam radiator is that it can be left there and no regulation of the intensity of heat is necessary. The cost of this device is very little as compared to the various types on the market to-day and any tinsmith can manufacture this piece of apparatus. Many modifications are possible to fit one's needs.

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