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INFESTATION OF SCALE INSECTS (CEROPLASTES IRREGULARIS CKLL.)

ON CHAMIZA (ATRIPLEX CANESCENS (PURSH) NUTT)

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ABSTRACT

A study was conducted to determine the effects of a scale insect (Ceroplaster irregularis Ckll.) on chamiza (Atriplex canescens (Pursh) Nutt.) in a portion of southern New Mexico. A sampling procedure of measuring all chamiza plants was used, and 148 sample units were taken from three sites. Forty-nine percent of the chamiza was found to be infested, and the medium height class showed the most severe infestation.

INTRODUCTION

This study was conducted to determine the occurrence and effects of a scale insect (Ceroplaster irregularis Ckll.) on chamiza (Atriplex canescens (Pursh) Nutt.).

Scale insects, on a branch of chamiza, were identified as the irregular wax scale. These were identified by comparison with Cockerell's scientific specimen in the insect museum of the Biology Department at New Mexico State University. Essig (1926) described these scale insects as compact colonies on branches of various species of Atriplex.

The red wax scale (C. rubens Muskell), a related species, was one of many species examined by Steinweden (1929) in his generic classification of the family Coccidae. This scale causes typical scale insect infestation on Satsuma orange trees in Japan, according to Wardle (1929).

Scale insects are plant sap feeders. Many are of economic importance because of their damage to agricultural crops. Few studies have been conducted on the irregular wax scale's infestations of chamiza because neither are of economic importance.

The chamiza study sites can be described as brushlands, with Mexican tea (Ephedra trifurca), creosotebush (Larrea divaricata), desert willow (Chilopsis linearis), mesquite (Prosopis juliflora), cactii (Opuntia and Cholla), and Russian thistle (Salsola kali) as the associated genera and species of plants.

Details on measurements of heights and determinations of foliage lushness are presented in this paper.

METHODS

Location of Study

Measurement and observational data were taken in March, April and May of 1965 from 148 individual chamiza plants. Study sites were located in the vicinity of Las Cruces, New Mexico, and in the White Sands National Monument, New Mexico.

Height Measurements

Measurements were made with a six-foot rule which was divided into feet and inches. The higher-most branch was recorded for each bush with the rule placed in the center of the bush.

Observations of Lushness

These were relative observations made when each infected bush's height was being measured. The individual plants were placed in a category of reduced or luxuriant foliage type. The sex of each plant was also determined at this time by the presence or absence of seeds.

RESULTS AND DISCUSSION

Heights of Plants vs. Infestation

Height size classes of 5 inch intervals, beginning with 5 and going to 70-75 inches, were created (Fig. 1). The size class types were separated on the basis of the amount of scale insect infestation. The data appeared to indicate a definite separation and so 25-35 inches were treated as a group (A) and the rest as a group (B) (See Fig. 1).

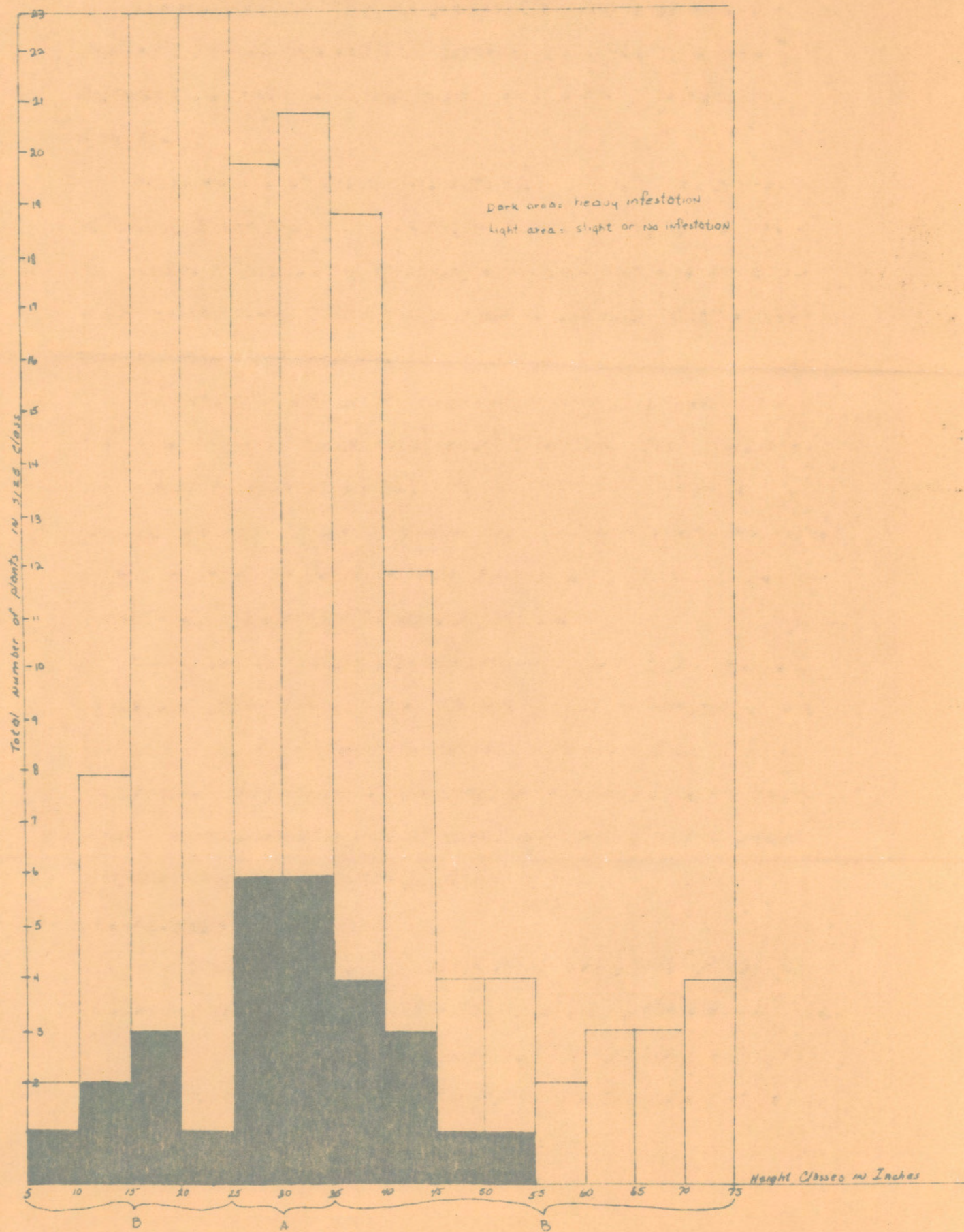


Fig. 1. Size Class Types

The darkened bars (Fig. 1) represent the number of chamiza plants that were severely infested with scale insects. The light bars represent the number of chamiza plants that had an infestation of 0 to 30%.

The A and B size class types were found to have a significance of 95%, with one degree of freedom, by the use of Chi Square. From the results of Chi Square, it could be expected that a future study would obtain results 95% of the time within the range of this study's results (Fig. 1 and Table I).

The chamiza plants of the B size class type were found to have the fewest cases of severe scale insect infection. The A size class type contains approximately half (12 out of 28) of all chamiza severely infested. The A class type was also found to have the highest percent of severe infestation, when the one to one ratio of the 5 to 10 inch height class was disregarded (Table I).

Plants in the B class type appeared to be less susceptible to severe scale insect infestation. This study wasn't designed to find the reasons why the A class type was the most susceptible to severe infestation. This aspect of the study would be a problem for future study. Another could be that of determining whether or not these scales are wind dispersed (Hely, 1960).

Observations on Foliage

In all cases of slight or severe scale insect infestation, the chamiza had reduced foliage. This reduction was in the size and number of leaves. The color of the leaves on these plants was a gray-green.

The noninfected chamiza had larger and greater numbers of leaves that were all of a definitely greener color.

Table I. Degree of I. per size class.

<u>Height Classes In Inches</u>	<u>Severe Infection</u>	<u>Slight Infection</u>	<u>% of H. to L. or N.</u> } <i>Infection</i>
5-10	1	1	50%
11-15	2	6	25%
16-20	3	20	13%
21-25	1	22	4.3%
26-30	6	14	30%
31-35	6	15	28.5%
36-40	4	15	21%
41-45	3	9	25%
46-50	1	3	25%
51-55	1	3	25%
56-60	1	2	0
61-65		3	0
66-70		3	0
71-75		4	0

Correlation of Infestation with Sex of Plants

The severely infected chamiza had a 50% male and female infection ratio (Table II). All study sites were found to have male and female chamiza with severe scale insect infection.

Chamiza Associated with Another Species

Only one study site was found to have severely infected chamiza in close association with mesquite. All other sites were chamiza in dominant stands. The mesquite bushes were checked for the irregular wax scale, but no infections were found.

On all sites the middle-sized severely infested chamiza (25-35 inches) could be of an old age group that has done poorly on the site, or just an age group that is more susceptible to the severe infestation. The lower infestation of the shorter and taller chamiza could possibly be attributed to physical fitness.

It could be that the middle-sized chamiza was located on soil lacking sufficient growth substances (water, nutrients, etc.) or there was an excess of growth retarding substances (salts, minerals, etc.). These would be interesting problems for further research.

Table II. Relative Scale Infection of Chamiza Sexes

Site	Male	Female	Percent of male to female infection
1	3	5	
2	2	2	
3	9	7	
Totals	14	14	50%

LITERATURE CITED

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- Hely, P. C. 1960. Dispersal of white wax scale (Ceroplaster destructor Newst) by wind. Jour. Australian Inst. Agric. Sci. 26(4):355-356.
- Steinweden, J. B. 1929. Bases for the generic classification of the coccoid family Coccidae. Entomol. Soc. Amer. Annals 22:231.
- Wardle, R. A. The problems of applied entomology. McGraw-Hill Book Co., Inc., New York. p. 260.

In note that accompanied this report, U.D.Z. reported professors comments (Drs. Dick-Peddie, Raitt, Zimmermann):

1. Sample sites were not truly random.
2. Severely infested plants might have become infested when small and were stunted
3. The size classes chosen were too few in number.