Seasonal Abundance of Western Flower Thrips Populations in Desert Head Lettuce

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Abstract

Studies were conducted from 2001-2004 to examine thrips abundance in multiple lettuce plantings throughout the growing season. Head lettuce was sampled periodically on untreated, 0.25 acre plots at various intervals from early September through March. Results clearly showed that thrips reproduction and development on desert lettuce is largely influenced by temperature. Thrips adults and larvae populations within each planting were consistently most abundant on lettuce planted in November and December where temperatures averaged 60-65 degrees F during the spring. Population development was at its lowest level in the October plantings, particularly during the cooler winter periods. This study demonstrates that western flower thrips populations are capable of reproducing and developing large densities on head lettuce under winter and spring growing conditions in the desert.

Introduction

Desert lettuce production remains highly dependant on the availability of effective IPM programs. The recent registration of several reduced risk insecticides now provides lettuce growers with a number of tools to effectively manage most insect pests (i.e., whiteflies, worms, aphids, and leafminers). However, western flower thrips continue to cause problems, both for domestic and foreign market opportunities. Because of the lack of empirical information on their biology and ecology, thrips may be the most important economic pest of winter lettuce grown in the desert. At the present time, lettuce growers rely almost exclusively on two insecticides, Lannate and Success, for their control. Not only is this approach expensive, but also places the industry at risk because of the increased threat of thrips developing resistance to these insecticides.

A significant research effort has been made to evaluate insecticide alternatives for thrips control, however, very little information is available on the biology and ecology of thrips in desert cropping systems. As a pest, thrips are unique on desert lettuce compared with other growing regions such as coastal California regions, Hawaii, or Florida where they are important disease vectors. Because thrips have become an important pest of lettuce in the past few years, information needs to be generated that is specific to the desert lettuce. Unfortunately, information on the seasonal abundance and infestation potential for thrips in desert lettuce is limited. Thus, with the objective of ultimately developing a pest management approach that would enhance our present chemical tactics, this project was conducted to begin examining the population dynamics of thrips on lettuce throughout the season in an attempt to identify planting windows that are at high risk from thrips infestation.

Materials and Methods

Studies to examine the spatial and temporal abundance of thrips populations were conducted on head lettuce at the Yuma Agricultural Center, Yuma, Arizona. Beginning in mid-September, 0.25 acre plots of head lettuce were planted at 2-2 week intervals. On each planting date (PD) lettuce was direct seeded into double row beds on 42 inch centers. Each planting was subdivided into 5 untreated plots and each plot consisted of 4 beds, 80 feet long. No insecticide applications were made during the study.

Thrips populations were assessed by estimating the number of thrips adults and larvae / plant by taking relative beat pan samples 4-5 times throughout each planting beginning at thinning and ending at harvest. On each sample date, four whole plants (n=20 per sampling date) were selected at random in each plot and individually removed from the soil at ground level. Plants were then beat vigorously against a screened pan for a predetermined duration (5-10 hits

for upper and lower plant portion). The pan measured 2" H by 15" L by 8" W and covered with meshed screen with 0.5 spacing. Inside of the pan was a yellow sticky trap (6" by 6") to catch and retain dislodged thrips. On samples collected at harvest, counts of heads and frame leaves were conducted separately. Head samples consisted of the head with cap leaf and 2 wrapper leaves. The head was then split in two and beat against the screen also. Frame leaf samples consisted of removing the head and 2 wrapper leaves and exposing as many leaves as possible while then beating the plant vigorously. Sticky traps were immediately covered with clear plastic and then taken to the laboratory where adult and larvae were counted under 10-20X magnification. Weather data was summarized for each sample date. Ambient temperatures for each AZMET site was prepared and provided graphically showing relative weekly trends across the season.

Results and Discussion

Seasonal population abundance of adult, larvae and total thrips during six lettuce planting dates over a three year period from 2001 to 2004 is shown in Figures 1-3. These data show that thrips reproduction and development on lettuce is largely influenced by temperature. This can be seen for each life stage within each planting where population abundance was greatest during the later lettuce plantings during November and December where temperatures averaged 60-65 degrees F. Population development was at its lowest level in the October plantings, particularly during the cooler winter periods. Although temperatures were quite warm during the March of 2004, thrips abundance was light, a consequence of unusually cool temperatures in January and early February. In contrast, greater development and abundance of thrips during the winter and spring in 2003, compared with 2002 and 2004, can largely be attributed to warmer temperatures in December, January and February.

This data suggests that during cool winters, October lettuce planting are at a lower risk of thrips infestation. However, this was not the case in 2003 due to mild winter conditions where all lettuce planting experienced significant thrips development and abundance. Table 1 shows the data for each year averaged across planting dates. This summary clearly shows the large abundance of thrips that occurred in 2002-2003 season, and strongly supports our contention that growers should be most cautious of thrips infestations in lettuce planted during November and December. Finally, this data demonstrates that western flower thrips are capable of reproducing and developing large population densities on head lettuce under winter and spring growing conditions in the desert.

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Table 1. Western flower thrips per plant averaged across lettuce plantings and years, Yuma Agricultural Center

	Wet date						
Season	**17-Sep**	**10-Oct**	**30-Oct**	**15-Nov**	**2-Dec**	**15-Dec**	**3 Yr Avg**
2001-2002	43.3	23.6	16.9	37.0	40.2	65.9	37.8
2002-2003	41.7	45.7	66.2	111.8	75.9	66.8	***68.0***
2003-2004	14.1	22.8	25.9	22.7	19.5	35.0	23.3
Avg	33.0	30.7	36.3	***57.2***	45.2	***55.9***	

Figure 1. Seasonal Abundance of Western Flower Thrips Larvae in Several Plantings of Head Lettuce Relative to Average Daily Temperatures, Yuma Agricultural Center, 2001-2004.

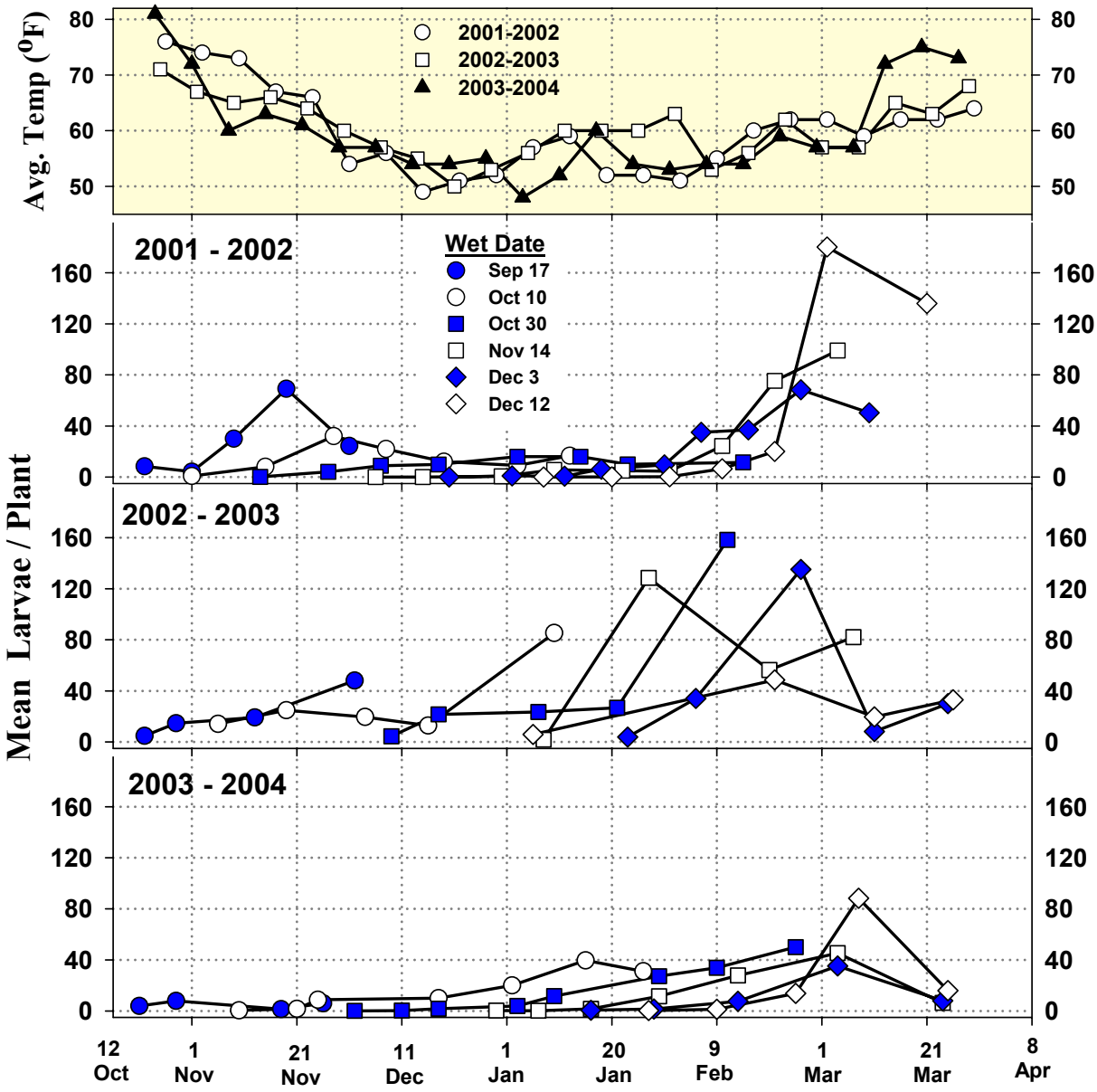

Figure 2. Seasonal Abundance of Western Flower Thrips Adults in Several Plantings of Head Lettuce Relative to Average Daily Temperatures, Yuma Agricultural Center, 2001-2004.

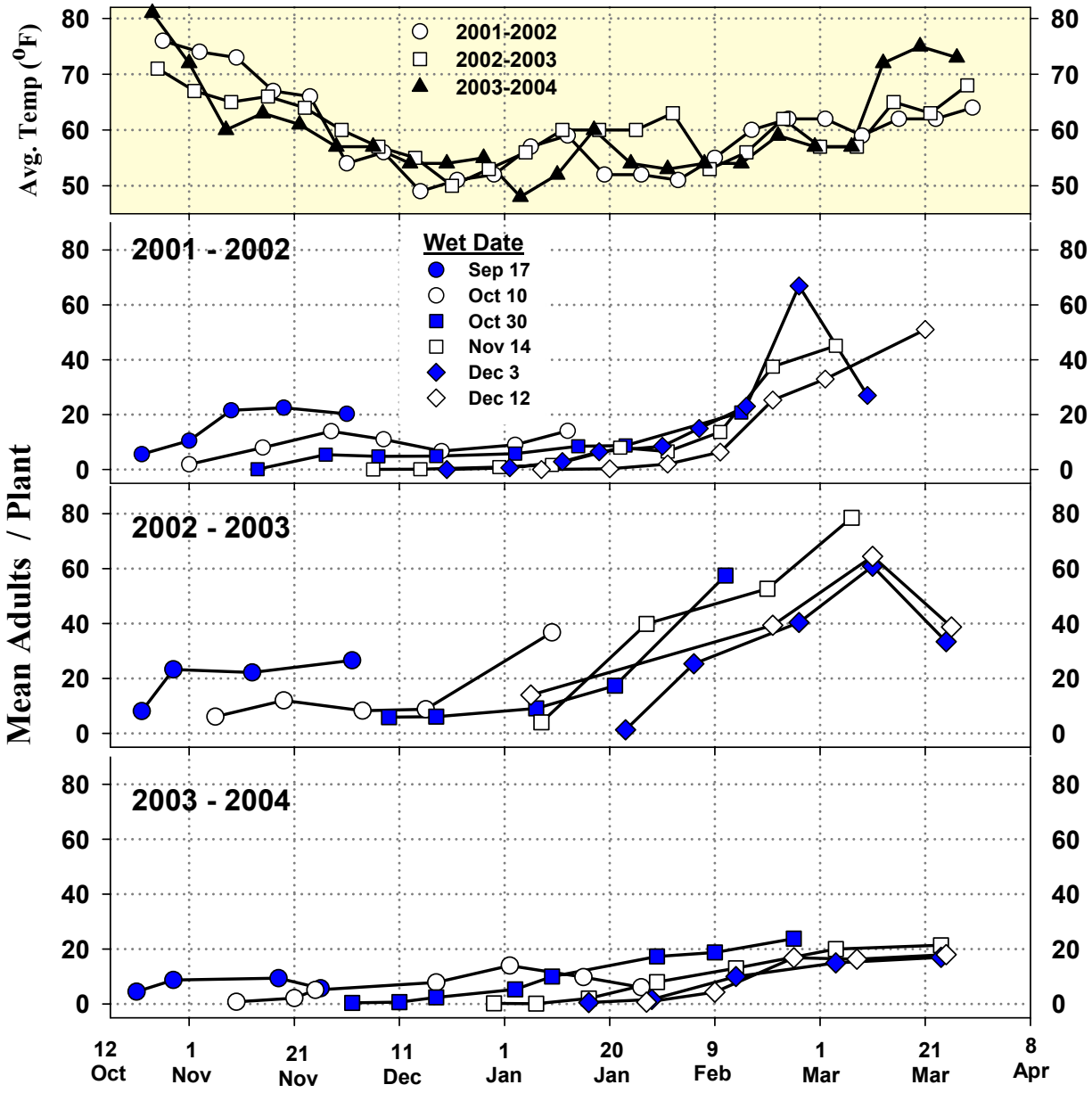

Figure 3. Seasonal Abundance of Total Western Flower Thrips (Adults and Larvae) in Several Plantings of Head Lettuce Relative to Average Daily Temperatures, Yuma Agricultural Center, 2001-2004.