

## ***Neohydatothrips burungae*** **Field Surveys and Distribution in California**

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### **Project Overview**

In December 2004, *Neohydatothrips burungae* was collected from avocado trees in San Diego California during a survey for avocado lace bug. *Neohydatothrips burungae* has been collected from avocados in Mexico and Guatemala by Hoddle (Hoddle et al., 2002). In Mexico and Guatemala this thrips was as common as avocado thrips, *Scirtothrips perseae*, in areas of intermediate altitude. In colder high altitude areas *S. perseae* dominated, almost exclusively, and in warmer more humid lowland areas *N. burungae* was dominant on avocados. *Neohydatothrips burungae* has also been collected in large numbers from mangoes in Nayarit, suggesting it may be more polyphagous than *S. perseae*. Further, this thrips has recently emerged as a major pest of commercial passion fruit production in Colombia, South America.

With a hand lens, *N. burungae* is very similar looking in color and size to *S. perseae* and without specialized training PCA's and growers would not be able to easily separate the two if collected together in the field. Often, *N. burungae* is more heavily maculated (brownish tiger striping on the body) than *S. perseae*. However, occasionally heavily maculated *S. perseae* can be collected and these specimens are easily confused with *N. burungae* when samples are being scanned quickly under a compound microscope at low magnification. When this work was originally commenced three years ago it unknown how widespread *N. burungae* was on California grown avocados or how common this thrips was in comparison to the widespread and pestiferous *S. perseae*. Consequently, regular surveys through all major avocado growing areas in California have been undertaken to survey for *N. burungae* to determine its distribution, abundance, and utilization of non-avocado host plants. To successfully manage foliage and fruit damaging thrips it is imperative to determine how widespread and abundant these pests are, this is especially important for populations of *N. burungae* in comparison to *S. perseae*. Additionally, specimens have been collected and preserved in 95% and stored in a freezer as part of this project for potential future DNA analysis (similar to the completed DNA fingerprinting project for *S. perseae*) and photography for educational and outreach purposes. Field surveys for *N. burungae* are now complete the collection records have been used to delineate the range of *N. burungae* on avocados in California.

### **Summary – Distribution of *Neohydatothrips burungae***

Extensive surveys in avocado orchards for *N. burungae* have been conducted in San Diego, Riverside, Ventura, Santa Barbara, and San Luis Obispo counties for *N. burungae*. Surveys

were conducted in August 2005, February, March, and May 2006, May and August 2007, March and August 2008. Survey results from 2005 to 2008 indicate that *N. burungae* is widespread in San Diego County on avocados but populations are very low in comparison to avocado thrips, *Scirtothrips perseae*. Very few specimens of *N. burungae* have been found in Riverside and Ventura counties on avocados over the course of this three year survey. This pest has not been found in San Luis Obispo County during any surveys.

### **Summary – Densities of *Neohydatothrips burungae***

In sites surveyed in San Diego County in August 2005 41% had *N. burungae* but just 6% (58) of collected thrips (4932 *S. perseae* were collected) were *N. burungae*. In 2005, just one site (10%) in Riverside County (UC Ag. Ops) had *N. burungae* and had 4 females. In 2005, 3979 thrips were collected from Ventura, Santa Barbara, and San Luis Obispo County avocado orchards and 0 (zero) *N. burungae* were found.

Survey results in February, March, and May 2006 differed little from results of the August 2005 survey. Low numbers of *N. burungae* were found in San Diego County, none in Riverside County (four females had been found the previous August). This resulted in *N. burungae* comprising 0.7% of total thrips collected from San Diego and Riverside Counties. A single female was found in Ventura County in February 2006 and no *N. burungae* were found in Santa Barbara or San Luis Obispo Counties. This single find of one female *N. burungae* in Ventura County accounted for 0.08% of total thrips collected from avocados north of Los Angeles.

Survey results for May and August 2007 have followed the same trends observed for 2005 and 2006. In May 2007, in San Diego and Riverside Counties, just 17 *N. burungae* were collected from seven sites out of a total of 16 sites surveyed (i.e., 44% sites were infested at low levels). Of all the *S. perseae* and *N. burungae* collected, *N. burungae* accounted for ~5% of foliage feeding thrips. In August 2007, in San Diego and Riverside Counties, *N. burungae* accounted for ~2% of foliage feeding thrips and nine out of 17 sites surveyed (53%) had *N. burungae*. In Ventura County, in May 2007, *N. burungae* accounted for 4% of thrips collected from foliage and 50% of sampled orchards (four out of eight) had *N. burungae*. This thrips was not found in Carpinteria or San Luis Obispo County in May 2007. In August 2007, *N. burungae* accounted for ~1% of thrips collected from avocado foliage in Ventura County, and this pest was found in just three of the eight orchards sampled. *Neohydatothrips burungae* was not found in surveyed orchards in Carpinteria or San Luis Obispo County.

Survey results for March and August 2008 followed the same trends as observed for 2007. In March 2008, in San Diego and Riverside Counties, just 24 *N. burungae* were collected from 8 sites out of a total of 16 sites surveyed (i.e., 50% sites were infested at low levels). Of all the *S. perseae* and *N. burungae* collected, *N. burungae* accounted for ~3% of foliage feeding thrips. In August 2008, in San Diego and Riverside Counties, *N. burungae* accounted for ~2.7% of foliage feeding thrips and 8 out of 17 sites surveyed (47%) had *N. burungae*. In Ventura County, in March 2008, *N. burungae* accounted for 5% of thrips collected from foliage and 63% of sampled orchards (five out of eight) had *N. burungae*. This thrips was not found in Carpinteria or San Luis Obispo County in March 2008. In August 2008, *N. burungae* accounted for ~1% of thrips collected from avocado foliage in Ventura County, and this pest was found in just two of the eight orchards sampled. *Neohydatothrips burungae* was not found in surveyed orchards in Carpinteria or San Luis Obispo County.

### Summary – Surprise New Finding

In September 2008, male and female *N. burungae* was collected from redberry, *Rhamnus crocea*, a native California plant. Specimens were collected from along Highway 1 in Big Sur (N35°53.059; W121°27.397; elevation 330 ft) and identified by Dr. Laurence Mound (email communication on October 13 2008). The implications of this find are potentially important. Firstly, *N. burungae* was not collected from avocados over a three year period in Santa Barbara or San Luis Obispo, but has been found in the Big Sur area. This could suggest that *N. burungae* is actually in Santa Barbara and San Luis Obispo, but at densities too low to detect. Secondly, *N. burungae* may actually be a native to North America, Mexico, and Central America, and this species has not been detected before in North America, and California is part of the natural range of this species. Thirdly, *N. burungae* is an invasive thrips that is able to survive on native plants in the wilderness areas of California.

### Conclusions

The significance of these results is uncertain and several scenarios are possible: (1) Climatic and growing conditions are unfavorable for *N. burungae* in California and populations and the geographic range of this insect are not going to increase significantly from currently observed levels. (2) *S. perseae* under California growing conditions is too strong a competitor for *N. burungae* and will suppress population growth of *N. burungae*. (3) *N. burungae* is going through a lag phase as it adjusts to California conditions and is continuing to spread at low almost undetectable densities. Populations may erupt and cause significant damage once the lag phase is over and this thrips is more easily detected and damage observed because of substantially higher population densities. (4) *N. burungae* is native to California, and low density populations in native habitat had not been observed before, or *N. burungae* has been described under some other name from North America.

**Fig. 1.** (A) Avocado thrips, *Scirtothrips perseae*, and (B) *Neohydatothrips burungae* are very similar in size, color, and habit. This makes them very difficult to accurately distinguish apart in the field when examining avocado leaves with a hand lens.

