Seasonal Occurrence of Thrips (Thysanoptera) on Cowpeas in Western Arkansas and Northeast Oklahoma[1]

M. B. Sweeden and Paul J. McLeod

Department of Entomology, University of Arkansas
Fayetteville, Arkansas 72701

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ABSTRACT Three thrips species were commonly found in western Arkansas and northeast Oklahoma cowpea fields during the 1991 and 1992 growing seasons. These were the tobacco thrips, *Frankliniella fusca* (Hinds), the flower thrips, *Frankliniella tritici* (Fitch), and the soybean thrips, *Sericothrips variabilis* (Beach). Earlier planted cowpea fields in each area had higher thrips numbers than later planted fields. Tobacco thrips numbers tended to be higher during the early stages of the crop when the plants were small. As plants began to produce blooms, flower thrips numbers increased considerably. Peak flower thrips numbers typically occurred around two weeks after first bloom. Soybean thrips abundance was generally lower than the other common species and had no apparent pattern. *Chirothrips crassus* Hinds and *Chirothrips spiniceps* Hood also were found, but were uncommon.

KEY WORDS Insecta, thrips, *Frankliniella fusca, F. tritici, Sericothrips variabilis,* cowpea.

Various insects infest cowpea or southernpea, *Vigna unguiculata* (L.) Walpers, depending on the geographic area. Parts of the southeastern U. S. are plagued by the cowpea curculio, *Chalcodermus aeneus* Boheman (Bissell 1936, Arant 1938, Dupree and Beckham 1955, Chalfant 1985). California historically has had lygus bugs, *Lygus hesperus* Knight and *Lygus elisus* Van Duzee, as its most important cowpea pests (Middlekauff and Stevenson 1952). In Africa, several species of thrips damage cowpea (Singh and Jackai 1985). Legume bud thrips, *Megalurothrips sjostedti* (Trybom), are among these and often cause up to 60% damage to the crop (Singh and Taylor 1978). However, none of the insect pest species of cowpeas in Africa occur in the United States (Chalfant 1976).

Few studies have examined thrips occurrence on cowpeas in the U. S. Chalfant and Johnson (1972) reported yield decreases were significantly correlated with thrips injury, symptoms of which were moderate to severe blasting and distortion of leaves. Chalfant (1976) mentioned *Frankliniella fusca* (Hinds), *Frankliniella tritici* (Fitch), *Frankliniella bispinosa* (Morgan), and *Sericothrips variabilis* (Beach) as thrips species occurring on cowpeas in Georgia. Beshear (1983) added *Frankliniella occidentalis* (Pergande) to the list of thrips species of concern on Georgia cowpeas.

Insects, disease, and management costs have caused a shift in cowpea production from Georgia and Florida to more western areas. Western Arkansas and eastern Oklahoma have experienced increased cowpea production in recent

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years; one factor responsible for this has been the absence or infrequent occurrence of the cowpea curculio. As this production shift has occurred, concern with other insect pests, especially thrips, has increased. Because so little was known about thrips on cowpeas, especially in Arkansas and Oklahoma, research was initiated to provide cowpea producers information to aid in management decisions. The objective of the research was to determine the species composition and seasonal abundance of thrips on cowpeas grown in western Arkansas and eastern Oklahoma.

Materials and Methods

During the 1991 growing season, four fields of cowpeas were sampled, i.e., early-planted and late-planted in Delaware Co., OK and early-planted and late-planted at Kibler, AR. These two locations varied considerably with the Delaware Co. fields located on the old prairie of northeastern Oklahoma while the Kibler fields were located on the sandy bottomland of the Arkansas River Valley. Similar fields in the same areas ware sampled in 1992. Early-planted cowpeas in Oklahoma were cv. 'Mississippi Silver' while later-planted cowpeas were cv. 'Pink Eye Purple Hull,' during both years. Cowpeas sampled in the Arkansas River Valley during 1991 were cv. 'Pink Eye Purple Hull-BVR' and in 1992 were 'Coronet'. Planting dates during 1991 were 20 June and 5-6 July in Oklahoma and 12 June and 6 July at Kibler. During 1992, planting dates were 22 June and 30 June in Oklahoma and 22 June and 30 June at Kibler.

Initial thrips samples were obtained by collecting 20 plants from each field (four plants from each of five areas, NE, NW, SE, SW, C) each week. Sampled plants were placed individually in 0.946-liter resealable storage bags (Dow-Brands Inc., Indianapolis, IN) while the plants were small, or 3.785-liter resealable bags when the plants were larger. At initial bloom, the blooms were harvested and placed in the bags and the plant was shaken over a 26 × 40 × 7 cm white pan to collect thrips. The bagged plants and/or blooms were transported to the laboratory where the thrips were counted and placed in vials of 70% ethyl alcohol for identification. Plants that could not be examined immediately were held at 4°C. The thrips were separated based on their appearance and were mounted on microscope slides for identification. A representative sample of the different species was then sent to Dr. Charles Cole, Texas Agricultural Extension Service, for verification and or identification. Data from the thrips sampling were analyzed with PROC GLM (SAS Institute 1987) and graphed with SYSTAT (Wilkinson 1986).

Results and Discussion

Three thrips species were commonly found in cowpea fields sampled (Fig. 1 and 2). These were the tobacco thrips, *Frankliniella fusca* (Hinds), the flower thrips, *Frankliniella tritici* (Fitch), and the soybean thrips, *Sericothrips variabilis* (Beach). Other, uncommon species were *Chirothrips crassus* Hinds and *Chirothrips spiniceps* Hood.

Earlier-planted fields in an area generally had higher thrips numbers than the later-planted fields (Fig. 1 and 2). One exception was in fields near Kibler in

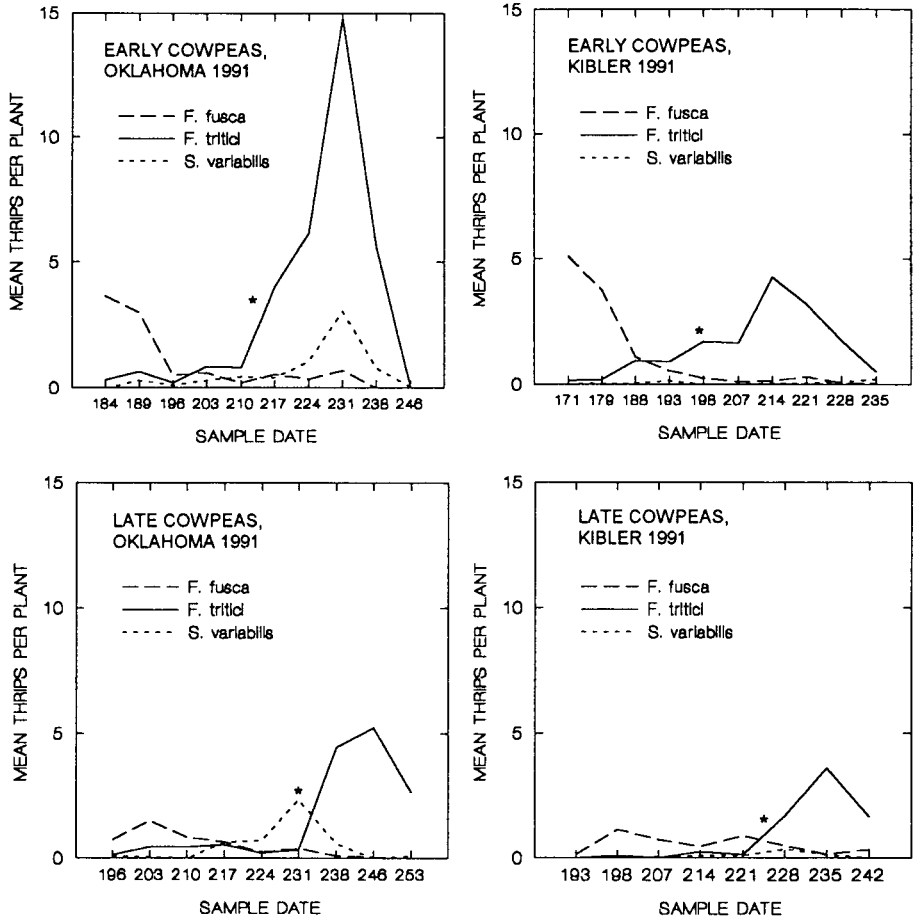

Fig. 1. Occurrence of thrips on western Arkansas and northeast Oklahoma cowpeas during 1991. Asterisks indicate first bloom stage of crop.

1992. June and July of 1992 in the Arkansas River Valley were considerably wetter than usual with a total of 23.98 cm of rainfall (Univ. of Ark. Vegetable Substation, Kibler). The 30-year average for the area during these months is 17.55 cm (National Weather Service, Fort Smith, AR). This atypical weather could possibly have resulted in atypical thrips population dynamics. Another possible explanation is that the difference in planting dates for these two fields was less than some others compared as earlier and later. The Kibler plantings during 1992 were only eight days apart compared to 24 days between plantings in 1991. Tobacco thrips numbers were usually highest on young plants during early periods of crop growth such as unifoliate, trifoliate, and V-2 stages. They were often feeding within the new leaves of an opening leaf bud. The abundance

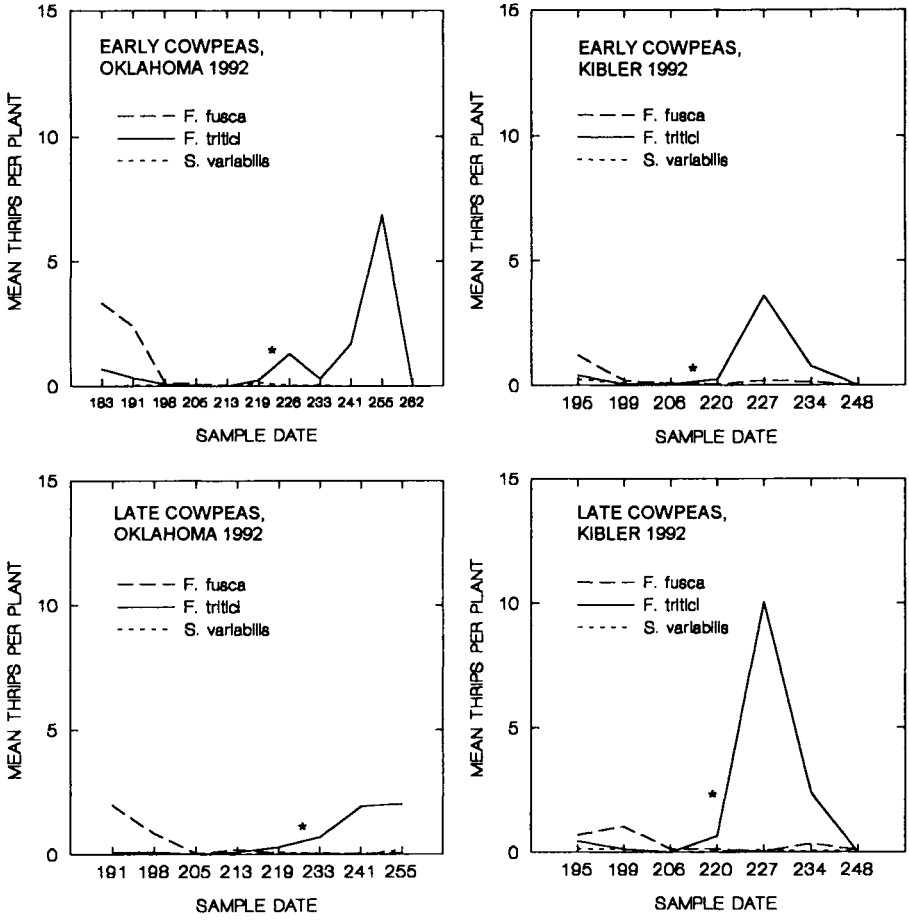

Fig. 2. Occurrence of thrips on western Arkansas and northeast Oklahoma cowpeas during 1992. Asterisks indicate first bloom stage of crop.

of soybean thrips had no apparent pattern and their numbers were generally lower than the other two common species. Field observations indicated that flower thrips occurred most often inside blooms. Their numbers increased considerably as the plants started blooming. Abundance of flower thrips on cowpea usually peaked approximately two weeks after first bloom (Fig. 1 and 2). Because early cowpeas usually had more thrips than later-planted cowpeas, perhaps this was a seasonal pattern. By the time late-planted cowpeas are blooming, other plants may be available that flower thrips utilize as hosts instead of being as concentrated as they are earlier in the year.

Sampling date had a significant effect on flower thrips and tobacco thrips numbers in each of the fields sampled (P = 0.0001 - 0.0306). The effect of sample date on soybean thrips numbers was significant for some fields and not for others (P = 0.0001 - 0.5076). There did not appear to be any pattern to this effect on soybean thrips numbers.

There was a significant effect of the within-field sample area on flower thrips numbers in both late fields during 1991 and the late Kibler field during 1992 (P = 0.0002 - 0.0051). Areas of these fields with highest flower thrips numbers were in the general direction of the early-planted fields, which suggests some flower thrips may move from one field to another. This seems likely because fields at Kibler during both years were separated only by a field road. The fields in Oklahoma were separated by ca. 0.8 km during 1991 and by a wooded fence line in 1992. Tobacco thrips numbers were significantly affected by sampled area in the early Oklahoma field in 1992 (P = 0.0004), but the reason for this is unclear. In all other cases, within-field sample area did not have a significant effect on thrips numbers.

Plant damage due to thrips was usually most apparent on the foliage. Often thrips were found in the developing leaf buds before the leaves expanded. Thrips feeding within these leaf buds probably accounts for much of the damage visible on fully expanded leaves. Cowpeas damaged by thrips have crinkled leaves with ragged edges. Areas on a leaf where the "crinkles" appear to originate tend to be a lighter color. Chalfant (1976) described this damage by mentioning how an expanding leaf assumes a crinkled, silvered appearance. The exact level of damage that results in a yield loss has not been reported.

Thrips feeding has been blamed for premature flower abscission in many crops. Legume bud thrips, *Megalurothrips sjostedti* (Trybom), feeding on cowpea in Africa can cause abscission of flower buds and peduncles leading to 100% yield loss (Wien and Roesingh 1980). Damage to blossoms other than abscission, however, is much less visible than foliage damage. Further work is needed to determine the effect of thrips species in the U. S. on cowpea blooms.

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