size (23). One commercial variety of tomato could withstand considerable foliage damage due to ozone exposure for a long period of time (21) without significant reduction in fruit size, weight or number, even though the fresh weight of stems and leaves was lowered by 27%. Even a decrease in stem and leaf fresh weight of 62% seemed to have minimal effects on yield.

Mechanical defoliation of tomato plants to study its effect on yield has been performed several times. Wiebe (33) found a significant yield reduction in greenhouse tomatoes, when all except the top two feet of leaves were removed, when compared to plants with only the senescent leaves taken off. Selective removal of overlapping leaves had no effect on yield. A yield reduction, especially in the largest fruit size categories was found as a result of repeated defoliation at high levels (60% or more) in staked tomato plants (13). Defoliation (80%) of processing tomatoes in Ohio when the tomatoes were at first bloom, full bloom, or 2.5 cm fruit diameter resulted in reduced yield (36). On the same study, defoliation of 25% or 50% prior to or at full bloom did not influence yield; however, 25% or 50% defoliation when fruits were 2.5 cm diameter did decrease yield (36). The effects of mechanical defoliation on yield and fruit quality of unstaked tomatoes grown for the fresh market have not previously been studied.

Actual damage to tomato plants by the leafminer-disease complex occurs gradually, sometimes over a considerable period of time. Exact duplication of this damage is virtually impossible so that simulation by mechanical defoliation may not accurately mimic the effect of natural defoliation (4). However, interpretation of this damage may be enhanced by using Pena's description of tomato phenology (22). He defined three developmental stages for 'Flora-Dade': vegetative (1 to 35 days), reproductive (36 to 135 days), and senescent (136 to 200 days).

The study presented here was undertaken to determine: 1) the times at which unstaked tomato plants are most sensitive to defoliation, and 2) the damage threshold at which unstaked tomato plants will show significant loss in yield and fruit quality when (a) defoliated only once, and (b) defoliated repeatedly.

MATERIALS AND METHODS

General

'Walter' tomatoes were planted in 1977 and 1978 at the University of Florida Agricultural Research and Education Center in Homestead, Dade County, Florida. After metribuzin was incorporated into the soil at a rate of 0.84 kg ai/ha, beds were prepared