

TOMATO PINWORM, KEIFERIA LYCOPERSICELLA (WALSHINGHAM)
(LEPIDOPTERA:GELECHIIDAE) IN FLORIDA^{1/}

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INTRODUCTION: THE TOMATO PINWORM IS A SMALL, MICROLEPIDOPTERAN MOTH THAT IS OFTEN CONFUSED WITH CLOSELY RELATED SPECIES WHICH HAVE SIMILAR HABITS. APPARENTLY MUCH OF THE DAMAGE TO TOMATOES ATTRIBUTED TO THE EGGPLANT LEAFMINER (GNORIMOSCHEMA GLOCHINELLA ZELLER) IN MEXICO AND CALIFORNIA DURING THE EARLY 1920'S WAS ACTUALLY INFLICTED BY THE TOMATO PINWORM (MORRILL, 1925). IT PERSISTED IN THE LITERATURE AS THE EGG-PLANT LEAFMINER UNTIL REDESCRIBED AS A NEW SPECIES (BUSK, 1928) COLLECTED FROM TOMATOES. IT WAS LATER SYNONYMIzed WITH EUCATOPTUS LYCOPERSICELLA WALSHINGHAM. CAPPS (1946) PROVIDED A KEY, WITH DESCRIPTIONS, THAT DEFINES THE SPECIES AND PERMITS IDENTIFICATION OF LARVAE WITH WHICH IT MIGHT BE CONFUSED.

DISTRIBUTION: TOMATO PINWORMS ARE FOUND IN THE WARM AGRICULTURAL AREAS OF MEXICO, CALIFORNIA, TEXAS, HAWAII, CUBA, HAITI AND THE BAHAMAS. ALSO, THEY HAVE BEEN REPORTED FROM GREENHOUSES IN DELAWARE, MISSISSIPPI, MISSOURI, PENNSYLVANIA AND VIRGINIA. FIELDS NEAR GREENHOUSES MAY BECOME INFESTED, BUT THE SPECIES DOES NOT OVERWINTER OUT OF DOORS IN COLDER REGIONS (THOMAS, 1933). IN FLORIDA IT IS COMMON IN TOMATO PRODUCING AREAS SOUTH OF TAMPA ALONG THE WEST COAST AND FROM FT. PIERCE SOUTH ALONG THE EAST COAST.

HOSTS: PLANTS OF THE NIGHTSHADE FAMILY, SOLANACEAE, ARE THE PREFERRED HOSTS OF PINWORMS. TOMATO, LYCOPERSICON ESCULENTUM L., IS INFESTED MOST COMMONLY, BUT EGGPLANT, SOLANUM MELONGENA L. VAR. 'ESCULENTUM' NEES, AND POTATOES, SOLANUM TUBEROSUM L. ALSO ARE ATTACKED. WEEDS SUCH AS S. CAROLINENSE L., S. XANTHII GRAY, AND S. UMBELLIFERUM ESCH. HAVE BEEN SUITABLE HOSTS. TOMATO, POTATO, EGGPLANT, AND A WEED, S. BAHAMESE L., ARE RECORDED HOSTS IN FLORIDA.

ECONOMIC IMPORTANCE: DAMAGE TO TOMATOES RESULTS FROM THE FEEDING OF LARVAE ON LEAVES, STEMS AND FRUIT. INITIAL INJURY IS SLIGHT AND APPEARS AS A SMALL LEAF MINE (FIG. 2, A). LATER INJURY INCLUDES LEAF FOLDING AND LEAF TYING. MATURE LARVAE MAY ABANDON THE LEAF AND BORE INTO THE FRUIT LEAVING A SMALL 'PIN' SIZE HOLE. SECONDARY DAMAGE RESULTS WHEN PLANT TISSUES BECOME INFECTED BY PATHOGENS AND THE PLANT DIES OR THE FRUIT ROTS. APPROXIMATELY 60 TO 80 PERCENT OF TOMATO FRUITS MAY BECOME INFESTED IN A SINGLE SEASON (ELMORE AND HOWLAND, 1943).

LIFE HISTORY: THE DEVELOPMENTAL TIME FOR EACH STAGE FROM EGG TO ADULT IS SHOWN IN TABLE 1 (ELMORE AND HOWLAND, 1943). EGGS ARE LAID SINGLY OR GROUPED IN TWO'S OR THREE'S ON THE HOST-PLANT FOLIAGE. THE EGGS ARE OPAQUE TO PALE YELLOW WHEN LAID BUT TURN ORANGE BEFORE HATCHING. THE FIRST INSTAR LARVAE SPIN A TENT OF SILK OVER THEMSELVES AND TUNNEL INTO THE LEAF. FURTHER FEEDING RESULTS IN A BLOTCH-LIKE MINE USUALLY ON THE SAME LEAF. THE THIRD AND FOURTH LARVAL STAGES FEED FROM WITHIN TIED LEAVES, FOLDED PORTIONS OF A LEAF, OR ENTER STEMS OR FRUITS. MATURE LARVAE (FIG. 1, B) ABANDON THE HOST AND FORM A LOOSE PUPAL CELL OF SAND GRAINS NEAR THE SOIL SURFACE. FROM THIS PUPAL CELL THE ADULT EMERGES 2 TO 4 WEEKS LATER.

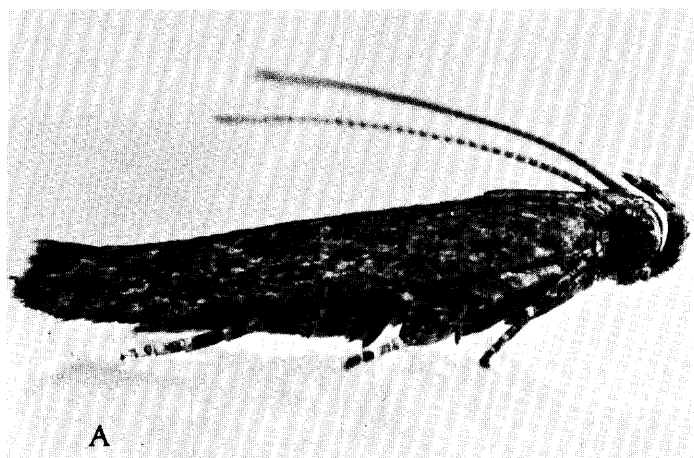


FIG. 1. KEIFERIA LYCOPERSICELLA, THE TOMATO PINWORM: (x 17) A. ADULT; B. LARVA ON TOMATO LEAF.

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ALTHOUGH THE LIFE CYCLE IS LENGTHY (TABLE 1), GENERATIONS OVERLAP AND INFESTATIONS QUICKLY MOUNT TO DAMAGING PROPORTIONS. SEVEN OR EIGHT GENERATIONS OR MORE PER YEAR CAN BE EXPECTED.

CONTROL: BECAUSE INFESTATIONS OFTEN RESULT FROM SHIPMENT OF PINWORMS IN PICKING CONTAINERS, CRATES, INFESTED FRUIT OR SEEDLINGS, AND FROM POPULATIONS PERPETUATED ON PLANTS LEFT IN FIELDS AFTER HARVEST OR LEFT IN SEED FLATS OR COMPOST HEAPS, SEVERAL SANITARY MEASURES SHOULD BE FOLLOWED (POE, 1973). THE PRECAUTIONS INCLUDE USE OF TRANSPLANTS THAT ARE FREE OF EGGS AND LARVAE WHEN SET IN THE FIELD, AND THE DESTRUCTION OF ALL PLANT DEBRIS AND FIELDS AFTER HARVEST. POPULATIONS MAY BE CONTROLLED EARLY DURING THE FIRST OR SECOND LARVAL STAGES WITH SEVERAL RECOMMENDED INSECTICIDES (DIAZINON, METHOMYL, PARATHION, DEMETON) (POE, 1973), HOWEVER, THIRD OR FOURTH INSTARS ARE PROTECTED BY LEAF FOLDS OR FRUIT, MAKING THE CONTROL OF OLDER INFESTATIONS DIFFICULT. CONSEQUENTLY CHEMICAL CONTROL IS CONTINGENT UPON FREQUENT AND ACCURATE OBSERVATION OF FIELDS FOR PINWORM MINES.

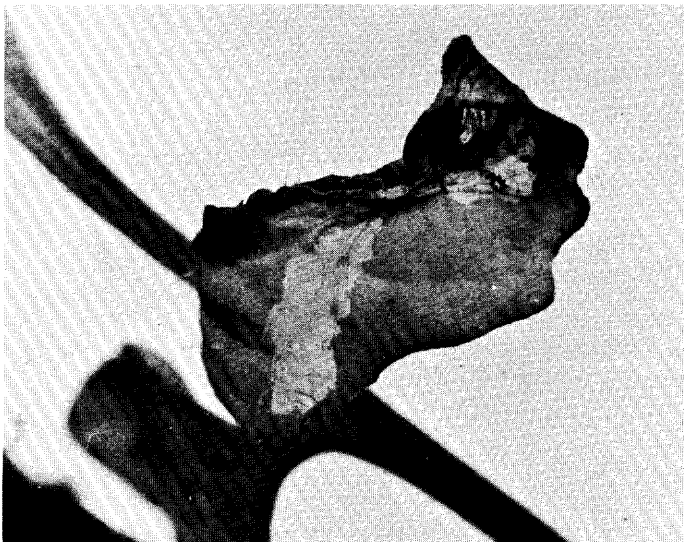


FIG. 2. LEAF DAMAGE TO TOMATO BY TOMATO PINWORM: (x 3).

DEVELOPMENTAL STAGE	NUMBER OF DAYS REQUIRED	
	AVERAGE	MINIMUM
EGG INCUBATION	8.9	4
LEAF MINING	11.5	5
LEAF FOLDING	9.5	3
PREPUPAE	6.9	1
PUPA	30.2	15
EGG TO ADULT	67.0	28

TABLE 1. DURATION OF THE DEVELOPMENTAL STAGES OF THE TOMATO PINWORM (ELMORE AND HOWLAND 1943).

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