

THE GRAPE LEAF FOLDER, *DESMIA FUNERALIS* (HÜBNER), A MINOR PEST OF GRAPE IN FLORIDA<sup>1/</sup>  
(LEPIDOPTERA:PYRAUSTIDAE)<sup>2/</sup>

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**INTRODUCTION:** THE GRAPE LEAF FOLDER IS A COMMON AND WIDELY DISTRIBUTED SPECIES THAT IS A MINOR PEST OF GRAPES IN THE UNITED STATES. IN CALIFORNIA SEVERE OUTBREAKS HAVE OCCURRED IN RESTRICTED AREAS DURING SOME YEARS. THESE OUTBREAKS HAVE BEEN ASSOCIATED WITH FAILURES OF PARASITES TO ATTAIN THEIR NORMAL LEVELS. IN FLORIDA THE GRAPE LEAF FOLDER HAS DONE SUBSTANTIAL DAMAGE TO GRAPE LEAVES IN SEPTEMBER AND OCTOBER AFTER THE SPRAY PROGRAM HAS BEEN DISCONTINUED BY SOME GROWERS. THIS MAY DEplete THE FOOD RESERVES IN THE VINE SUFFICIENTLY TO REDUCE THE SIZE OF THE NEXT CROP.

THE ABILITY TO CONTROL GRAPE PESTS IN FLORIDA IS BECOMING MORE MEANINGFUL WITH THE REBIRTH OF THE GRAPE INDUSTRY. AT ONE TIME, BUNCH GRAPE PLANTINGS NUMBERED SEVERAL THOUSAND ACRES IN FLORIDA, THEN NEARLY DISAPPEARED FROM THE ADVERSE EFFECTS OF PIERCE'S DISEASE. THE BUNCH GRAPE INDUSTRY STAGNATED FOR SEVERAL YEARS; HOWEVER, RECENT DEVELOPMENT OF SEVERAL RESISTENT VARIETIES BY THE UNIVERSITY OF FLORIDA WATERMELON AND GRAPE INVESTIGATIONS LABORATORY AT LEESBURG HAS SPURRED INTEREST. EVEN SO THERE ARE FEWER THAN 100 ACRES OF COMMERCIAL VINEYARDS IN FLORIDA, THE LARGEST BEING A 15-ACRE PLANTING AT PENSACOLA. HOME AND GARDEN PLANTINGS OF BUNCH GRAPES PROBABLY ARE EQUIVALENT TO ANOTHER 100 ACRES ACCORDING TO DR. JOHN A. MORTENSEN OF THE LEESBURG LAB. EXPANSION OF THE BUNCH GRAPE INDUSTRY IN FLORIDA SEEMS ASSURED AS THE IMPROVED VARIETIES BECOME AVAILABLE AND ARE BETTER KNOWN. THESE VARIETIES HAVE USES VARYING FROM TABLE OR DESSERT USE TO JELLY, JUICE, AND WINE MAKING.

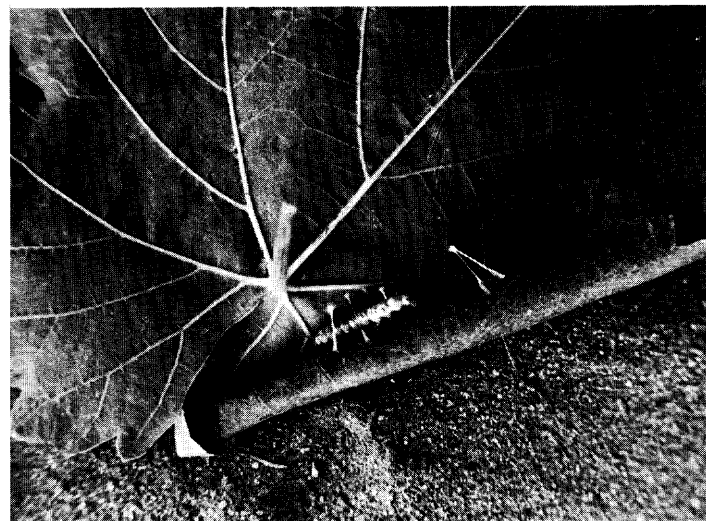
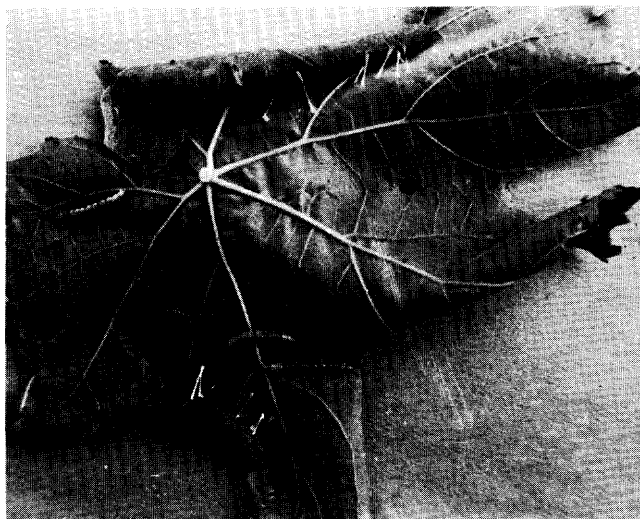


FIG. 1.

FIG. 2.

FIG. 1 & 2: GRAPE LEAVES SHOWING LEAF ROLLS, SILK STRANDS, AND FULLY GROWN LARVAE ( $3/4$  INCH LONG) OF THE GRAPE LEAF FOLDER, *DESMIA FUNERALIS* (HBN.); LARVAE REMOVED FROM ROLLS FOR PHOTOGRAPHIC PURPOSES. PRINTS LOANED THROUGH COURTESY OF F. L. JENSEN, FARM ADVISOR, TULARE COUNTY, CALIFORNIA.

**DETECTION AND IDENTIFICATION:** INJURY TO THE LEAVES IS VERY CHARACTERISTIC AND MAY BE EASILY RECOGNIZED (FIG. 1 & 2). AS SOON AS A LARVA IS LARGE ENOUGH IT FOLDS THE LEAF, EXPOSING THE UNDER SURFACE; THE EDGE IS HELD IN PLACE BY BANDS OF SILK THREAD. IT IS WITHIN THE PROTECTION OF THIS FOLD THAT THE LARVA FEEDS, SKELETONIZING THE LEAF ON THE UPPER SURFACE. WHEN THE LARVAE ARE NUMEROUS THE INJURY TO THE VINE BECOMES CONSPICUOUS, EVEN AT A CONSIDERABLE DISTANCE, BECAUSE THE LIGHT COLOR OF THE UNDER SURFACE OF THE FOLDED LEAVES CONTRASTS BOLDLY WITH THE DARK GREEN OF THE UPPER SIDE NORMALLY PRESENTED, THUS GIVING THE VINE A PATCHY APPEARANCE.

EGGS ARE SMALL (ABOUT  $1/32$  INCH LONG), FLAT, IRIDESCENT, ELLIPTICAL STRUCTURES LAID SINGLY ON THE UNDERSIDE OF A LEAF, OFTEN IN THE ANGLES BETWEEN A VEIN AND THE LEAF SURFACE. LARVAE ARE  $3/4$  INCH LONG WHEN FULLY GROWN. THEY ARE GLOSSY, TRANSLUCENT YELLOW-GREEN ON THE SIDES AND SOMEWHAT DARKER ABOVE, WITH SCATTERED FINE YELLOW HAIRS ON EACH SEGMENT. THE HEAD AND PROTHORACIC SHIELD ARE LIGHT BROWN, AND THERE ARE LIGHT BROWN SPOTS ON THE SIDES OF THE FIRST TWO THORACIC SEGMENTS. LARVAE WIGGLE VIGOROUSLY WHEN DISTURBED AND DROP TO THE GROUND. PUPAE AVERAGE A LITTLE OVER  $1/2$  INCH LONG; THEY ARE LIGHT BROWN JUST AFTER PUPATION, BUT SOON TURN DARK. ADULTS HAVE A WING EXPANSION VARYING FROM ABOUT

<sup>1/</sup> CONTRIBUTION No. 159, ENTOMOLOGY SECTION

<sup>2/</sup> SOME AUTHORITIES CONSIDER PYRAUSTIDAE A SUBFAMILY OF THE PYRALIDAE.

4/5 INCH TO NEARLY 1 1/4 INCHES. THE COLOR OF THE WINGS IS VERY DARK BROWN, ALMOST BLACK, WITH A SILVERY OR BLUISH IRESCENCE. THE FOREWINGS IN BOTH SEXES HAVE TWO NEARLY OVAL WHITE SPOTS. THE HIND WINGS OF THE MALE (FIG. 3) HAVE ONE WHITE BAR WHICH IN THE FEMALE IS PARTLY OR COMPLETELY DIVIDED INTO TWO SPOTS. BOTH SEXES HAVE VARIOUS AMOUNTS OF WHITE ON THE FRINGES OF THE WINGS AND PARTS OF THE HEAD, BODY, AND LEGS. THE ANTENNAE IN THE MALE APPEAR THICKENED AND NOTCHED NEAR THE MIDDLE, WHILE IN THE FEMALE THEY ARE UNIFORM AND THREADLIKE. ADULTS OF OTHER SPECIES OF DESMIA AND CERTAIN OTHER SIMILAR SPECIES IN FLORIDA HAVE THE WHITE SPOTS OF THE WINGS MUCH MORE LINEAR OR ARE OBVIOUSLY DIFFERENT IN NUMBER OF SPOTS OR SOME OTHER CHARACTERISTIC.

IN FLORIDA ADULTS HAVE BEEN COLLECTED REGULARLY IN STEINER AND BLACKLIGHT TRAPS.

**HOSTS:** WILD AND CULTIVATED GRAPES, VITIS spp., ARE THE PRINCIPAL HOSTS OF THE GRAPE LEAF FOLDER. TWO VARIETIES OF REDBUD, CERCIS CANADENSIS AND C. CHINENSIS; VIRGINIA CREEPER, PARTHENOCISSUS QUINQUEFOLIA; AND OENOTHERA HAVE BEEN REPORTED AS OCCASIONAL HOSTS. THE VARIETIES OF GRAPE MORE PRONE TO ATTACK ARE THOSE HAVING THINNER, MORE TENDER, AND HAIRY LEAVES.

**LIFE HISTORY:** WINTER IS PASSED IN THE PUPAL STAGE IN THE FOLDED AND FALLEN LEAVES. THE MOTHS EMERGE IN SPRING SHORTLY AFTER GRAPE FOLIAGE APPEARS AND LAY THEIR EGGS ON THE LEAVES. IN FLORIDA THE EARLIEST RECORDS FOR ADULTS ARE IN MID-FEBRUARY, IN THE SARASOTA AREA, BUT OTHER FEBRUARY RECORDS INCLUDE LOCALITIES IN INDIAN RIVER, MANATEE, OSCEOLA, AND VOLUSIA COUNTIES. ADULTS HAVE BEEN TAKEN ALL MONTHS OF THE YEAR IN FLORIDA EXCEPT JANUARY. COMPARATIVELY FEW LARVAL RECORDS ARE AVAILABLE FOR FLORIDA, BUT THE EARLIEST ONE IS IN MAY AND THE LATEST IN DECEMBER, WITH PEAK POPULATIONS OCCURRING FROM JULY INTO OCTOBER. THE NUMBERS OF FIRST BROOD LARVAE ARE REPORTED TO BE QUITE INSIGNIFICANT COMPARED TO THE SECOND BROOD. IN THE SOUTHERN UNITED STATES A THIRD BROOD LEADS INTO THE OVERWINTERING PUPAL STAGE. PRECISE DATA ON THE DEVELOPMENTAL STAGES OF DESMIA FUNERALIS IN FLORIDA ARE LACKING, BUT SMITH AND STAFFORD (1955) GIVE DATA FOR FRESNO, CALIFORNIA, THAT MAY APPROXIMATE DEVELOPMENT IN FLORIDA. THE MOTH FLIGHT PERIOD OF THE FIRST BROOD OCCURRED (AT FRESNO) FROM APRIL 2 TO MAY 24; EGG HATCHING REQUIRED 10 TO 17 DAYS. TOTAL TIME IN LARVAL STAGES WAS 3 TO 4 WEEKS, PUPAL TIME 10 TO 14 DAYS, TOTAL TIME FROM EGG TO EMERGENCE OF MOTH 6 1/2 TO 7 1/2 WEEKS. THE SECOND BROOD MOTH FLIGHT PERIOD WAS FROM JUNE 15 TO JULY 15; EGG HATCHING REQUIRED 4 TO 5 DAYS. TOTAL TIME IN LARVAL STAGES WAS 2 TO 3 WEEKS, PUPAL STAGE 7 TO 11 DAYS, TOTAL TIME FROM EGG TO EMERGENCE OF MOTH 4 TO 5 WEEKS. THE THIRD BROOD MOTH FLIGHT PERIOD EXTENDED FROM AUGUST 3 TO SEPTEMBER 5; EGGS HATCHED IN 4 TO 5 DAYS, LARVAE REQUIRED 3 TO 5 WEEKS TO COMPLETE GROWTH, AND ENSUING PUPAE OVERWINTERED. FEMALE MOTHS OF THE SECOND AND THIRD BROODS LAY MOST OF THEIR EGGS ON LEAVES ROLLED BY LARVAE OF A PREVIOUS BROOD. HOWEVER, MOTHS MAY FLY INTO AN UNINFESTED VINEYARD AS LATE AS MID-SUMMER AND START WHAT MAY BECOME A SERIOUS LEAF FOLDER PROBLEM.

LARVAE MAKE LEAF ROLLS BY SPINNING STRANDS OF SILK WHICH CONTRACT AND PULL THE LEAF TOGETHER. JENSEN (1966) NOTED THAT EACH BUNCH OF STRANDS CONTAINS 200 TO 300 INDIVIDUAL FILAMENTS AND ABOUT 10 SUCH TIES ARE NEEDED PER ROLL, INCLUDING SOME INSIDE WHERE THEY CANNOT BE SEEN. LARVAE FEED ON THE FREE EDGE OF THE LEAF INSIDE THE ROLL AND MAKE AT LEAST TWO SUCH ROLLS DURING THEIR DEVELOPMENT. THEY ALWAYS REMAIN INSIDE THE ROLLS OR BETWEEN LEAVES EXCEPT WHEN MOVING (AT NIGHT) FROM ONE LOCATION TO ANOTHER.

**CONTROL:** THE CURRENT STANDARD CHEMICAL EMPLOYED AGAINST THE "FOLDER" IS CARBARYL (SEVIN) AT 1 1/4 POUNDS OF 80% SPRAYABLE OR 2 POUNDS OF 50% WETTABLE POWDER PER 100 GALLONS OF WATER. THERE IS NO TIME LIMITATION FOR USE OF CARBARYL ON GRAPES. TESTS IN CALIFORNIA AND FLORIDA USING PREPARATIONS OF BACILLUS THURINGIENSIS SHOWED NO SIGNIFICANT DIFFERENCES IN CONTROL BETWEEN IT AND CARBARYL, BOTH GIVING GOOD RESULTS. WHERE IT IS IMPRACTICABLE TO SPRAY THE VINES, IT WILL BE DECIDEDLY ADVANTAGEOUS TO GO THOROUGHLY OVER THE PLANTS WHEN THE FOLDED LEAVES ARE IN EVIDENCE AND CRUSH THE LARVAE BY HAND. AS AN ADDITIONAL METHOD OF REDUCING INJURY IT IS ADVISABLE TO RAKE TOGETHER AND BURN FALLEN FOLIAGE IN THE FALL, SINCE THE INSECT PASSES THE WINTER IN THE PUPAL STAGE IN THESE LEAVES.

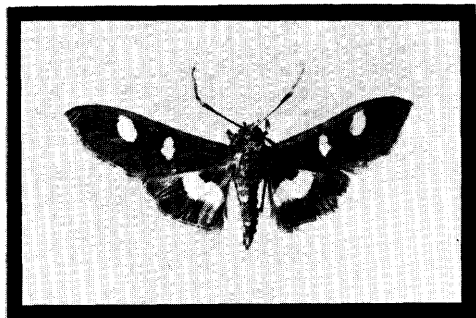


FIG. 3.  
GRAPE LEAF FOLDER ♂  
1.5X

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