

THE BANANA ROOT BORER (*COSMOPOLITES SORDIDUS* (GERMAR)) IN FLORIDA
(COLEOPTERA: CURCULIONIDAE)^{1/}

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INTRODUCTION: AT VARIOUS TIMES IN THE PAST, BANANAS HAVE BEEN GROWN ON A COMMERCIAL SCALE IN FLORIDA, ALTHOUGH THE PLANT IS PRESENTLY USED PRIMARILY AS AN ORNAMENTAL (STAMBAUGH, 1951). ONE OF THE MOST SERIOUS INSECT PESTS OF BANANAS, THE BANANA ROOT BORER, *COSMOPOLITES SORDIDUS* (GERM.), HAS BEEN TRANSPORTED THROUGHOUT THE BANANA GROWING REGIONS OF THE WORLD. PIERCE (1918) HAD NO SOONER WARNED THAT IT WAS A LIKELY PEST TO BE INTRODUCED UNTIL IT WAS FOUND IN FLORIDA (NEWELL, 1919). THIS CIRCULAR IS PREPARED TO ACQUAINT THE NURSERY INSPECTOR WITH THE PEST SO IT CAN BE MORE READILY DETECTED. LITTLE INFORMATION IS AVAILABLE ABOUT ITS CURRENT STATUS AND DISTRIBUTION IN FLORIDA, ALTHOUGH IT WAS ERRO-NEOUSLY RECORDED AS ERADICATED IN THE STATE BY LYLE (1947) AND THE COMMONWEALTH INSTITUTE OF ENTO-MOLOGY (1968). CURRENT COLLECTIONS ARE NEEDED TO SUBSTANTIATE ITS PRESENT STATUS.

DESCRIPTION: THE BRIEF DESCRIPTIONS AND ILLUSTRATIONS GIVEN HERE ARE FOR GENERAL HABITUS. TECHNICAL DESCRIPTIONS OF ALL STAGES ARE PRESENTED BY MOZNETTE (1920) AND ANDERSON (1948). THE ADULT WEEVIL IS DARK BROWN TO GREY BLACK, SHINING, ABOUT 11 MM LONG (FIG. 1). IT IS SIMILAR IN GENERAL APPEARANCE TO THE BILLBUGS (*SPHENOPHORUS*), BUT LACKS THE DEPRESSIONS ON THE PRONOTUM. ALL TIBIAE ARE ARMED WITH HOOK-LIKE EXTENSIONS WHICH ENABLE THE BEETLE TO HOLD TIGHTLY TO PLANT TISSUE. THE LARVA IS TYPICAL OF THE WEEVIL SUBFAMILY CALENDRIINAE (FIG. 2), THE BODY WHITE AND THE HEAD CAPSULE DARK REDDISH BROWN. THE LAST TWO ABDOMINAL SEGMENTS ARE MODIFIED INTO A PLATE-LIKE STRUCTURE GIVING A "CHOPPED OFF" APPEARANCE IN LATERAL VIEW. THE EIGHTH ABDOMINAL SEGMENT BEARS A LARGE ELONGATE SPIRACLE, BUT ALL OTHER ABDOMI-NAL SPIRACLES ARE MINUTE AND INDISTINCT. THE PUPA IS ALSO TYPICAL OF THE SUBFAMILY CALENDRIINAE (FIG. 3,4), THE BEAK BEING VERY IRREGULARLY MARGINED WITH NUMEROUS TRANSVERSE DEPRESSIONS.

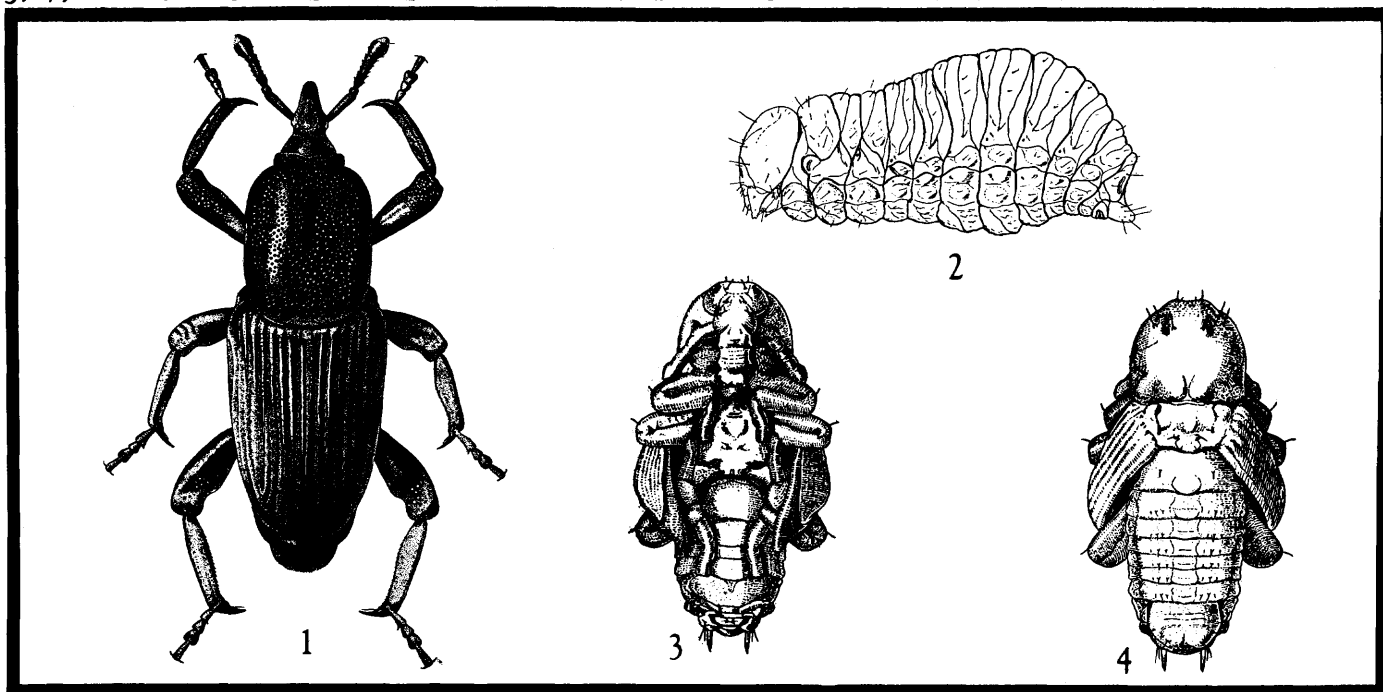


FIG. 1-4. *COSMOPOLITES SORDIDUS* (GERM.), AFTER MOZNETTE (1920); 1 - ADULT, 2 - LARVA, 3 - PUPA (VENTRAL), 4 - PUPA (DORSAL).

BIOLOGY: EGGS ARE LAID BETWEEN LEAF SHEATHS AND STEMS AS WELL AS AROUND THE CORM, OFTEN IN THE ENLARGED CELL-LIKE COMPARTMENTS IN THE TISSUE. THEY ARE USUALLY DEPOSITED SINGLY WITH THE NEWLY HATCHED LARVA BORING INTO THE CORM. THE COMPLETE LIFE CYCLE IS FROM 30 TO 40 DAYS; EGG 5 TO 7 DAYS, LARVA 15 TO 20 DAYS, PUPA 6 TO 8 DAYS. THE ADULT CAN LIVE FOR LONG PERIODS WITHOUT FOOD AND HAS BEEN RECORDED TO LIVE FOR OVER 2 YEARS. THE ADULTS ARE SECRETIVE IN HABITS AND MORE ABUNDANT AT NIGHT. ALTHOUGH SOME AUTHORS HAVE STATED THEY ARE FLIGHTLESS, THEY HAVE FUNCTIONAL WINGS AND HAVE BEEN OBSERVED OCCASIONALLY IN FLIGHT (SIMMONDS, 1966). TRAPS CAN BE MADE BY PLACING SLICED CORMS OR CUT SECTIONS OF STEM ON THE GROUND AND COLLECTING THE WEEVILS ATTRACTED TO THEM. MOST DAMAGE IS DONE BY THE EXTENSIVE TUNNELING OF THE LARVAE IN THE CORM, THUS WEAKENING THE PLANT AND CAUSING BLOW-DOWN BY EVEN SLIGHT WINDS. HORD AND FLIPPIN (1956) TESTED THE WEEVIL AS A POSSIBLE VECTOR OF HEAD ROT IN HONDURAS, BUT CAME TO THE CONCLUSION THAT IT "...ATTACKS RHIZOMES OF BANANA INDEPENDENTLY OF THE HEAD ROT ORGANISM, AND CARRIES OUT ITS ACTIVITIES WHEREVER POSSIBLE ON HEALTHY TISSUE."

HOSTS: APPARENTLY ALL VARIETIES OF BANANA ARE ATTACKED, ALTHOUGH SOME PREFERENCES HAVE BEEN NOTED (HORD AND FLIPPIN, 1956). IT HAS ALSO BEEN FOUND ON MANILA HEMP, PLANTAIN, SUGAR CANE AND YAM. IT APPEARS TO BE A VERY MINOR PEST OF THE LATTER TWO, PERHAPS ATTACKING THEM ONLY WHEN BANANAS ARE NOT READILY AVAILABLE. ZIMMERMAN (1968a) LISTED THE HOSTS AS MUSA SPECIES WITH THE NOTE "THE RECORDS OF ATTACKS ON SUGARCANE APPEAR TO BE IN ERROR."

DISTRIBUTION: IT IS KNOWN FROM NEARLY ALL BANANA GROWING AREAS OF THE WORLD, WITH THE NOTABLE EXCEPTION OF HAWAII. CORMS OR RHIZOMES ARE USED FOR PROPAGATION AND EGGS AND LARVAE ARE EASILY TRANSPORTED THEREIN. THE PRESENT WORLD DISTRIBUTION WAS MAPPED BY THE COMMONWEALTH INSTITUTE OF ENTOMOLOGY (1968), LISTING SOUTHERN ASIA, AFRICA, MANY PACIFIC ISLANDS, AUSTRALIA, NORTHERN SOUTH AMERICA, MOST OF CENTRAL AMERICA AND THE WEST INDIES. IN NORTH AMERICA IT IS KNOWN ONLY FROM COTAXTLA, VERACRUZ, MEXICO AND FLORIDA. THE FLORIDA RECORDS ARE NOT SHOWN ON THE MAP (L.C.) WITH THE FOLLOWING NOTATION "...THE LOCALISED OUTBREAK OF 1917-18 IN FLORIDA, MOZNETTE...WAS RAPIDLY EXTERMINATED..." THE FIRST FLORIDA INFESTATION WAS FOUND AT LARKIN (DADE COUNTY) IN DECEMBER 1917 AND MARCH 1918 IN MANATEE COUNTY "...THIS APPEARING TO BE THE POINT WHERE THE INSECT HAD BECOME ESTABLISHED SEVERAL YEARS PREVIOUSLY." (NEWELL, 1921). IF THE SPECIES WAS ERADICATED IT WAS SOON REINTRODUCED AND HAS PROBABLY BEEN PRESENT SINCE 1920. NEWELL (1921) DISCUSSED THE ERADICATION PROGRAM INITIATED AFTER THE FIRST INFESTATION WAS DISCOVERED AND STATED THAT "...NO INFESTATIONS...ARE KNOWN TO OCCUR IN THE STATE AT PRESENT." SLEEPER (1957) RECORDED IT FROM MARCO, FLAMINGO, FT. MYERS, OPA LOCKA, MIAMI, LARKIN AND COCONUT GROVE. THE FLORIDA STATE COLLECTION OF ARTHROPODS CONTAINS THE FOLLOWING ADDITIONAL RECORDS: ORMOND, PALMA SOLA, BUCKINGHAM, KEY WEST, CORAL GABLES, WHITE CITY, CUTLER AND HOMESTEAD. NO SPECIMENS HAVE BEEN RECEIVED FOR IDENTIFICATION SINCE 1958, ALTHOUGH THIS UNDOUBTEDLY REFLECTS ONLY LACK OF COLLECTING.

TAXONOMY: BLACKWELDER (1947:915) LISTED THE FOLLOWING SYNONYMS OF C. SORDIDA (GERM.): CRIBRICOLLIS WALKER, MENDICA OLIVIER, AND STRIATA FAHR. ZIMMERMAN (1968b) DISCUSSED ANOTHER CLOSELY RELATED SPECIES, C. PRUNINOSUS HELLER, AS A PEST OF BANANAS IN MICRONESIA. IN SOME OF THE EARLIER LITERATURE C. SORDIDA WAS PLACED IN THE GENUS SPHENOPHORUS.

CONTROL: ROBERTS (1958) RECORDED SUCCESSFUL CONTROL IN CENTRAL AMERICA WITH ALDRIN AND DIELDRIN, BUT AT 2 LBS. TOXICANT PER ACRE, DDT, CHLORDANE, TOXAPHENE, METHOXYCHLOR AND RHOthane WERE NOT EFFECTIVE. DIELDRIN AT THAT RATE GAVE GOOD CONTROL FOR 2 YEARS WHEN APPLIED TO THE BASE OF THE PLANT. ALDRIN, AT THE SAME RATE, GAVE FASTER CONTROL BUT HAD LESS RESIDUAL EFFECT. WOLFENBARGER (1965) FOUND UNDER SOUTH FLORIDA CONDITIONS OF ALKALINE SOILS THAT ALDRIN WAS MOST EFFECTIVE. HE ALSO RECOMMENDED DIPPING OF CORMS IN EMULSIVE FORMULATIONS TO PREVENT SPREAD AND MOVEMENT OF THE WEEVIL. HORD AND FLIPPIN (1956) STATED THAT CHLORDANE, DILUTED 3:2000, APPLIED AT THE RATE OF 200 GALLONS PER HECTARE, AT MONTHLY INTERVALS, GREATLY REDUCED WEEVIL POPULATIONS WITH NO HARMFUL EFFECTS TO THE PLANTS. BULLOCK & EVERS (1962) RECOMMENDED 2 LBS. ACTUAL GRANULAR DIELDRIN PER ACRE AND FOUND IT EFFECTIVE FOR 18 MONTHS.

SEVERAL PREDATORS (ESPECIALLY FROM MALAYA) HAVE EXERCISED SOME BIOLOGICAL CONTROL AND HAVE BEEN INTRODUCED INTO CERTAIN BANANA GROWING REGIONS. THE MOST SUCCESSFUL OF THESE IS A HISTERID BEETLE, PLAESIUS JAVANUS ERICHS. (SIMMONDS, 1966). APPARENTLY NONE OF THESE HAVE BEEN INTRODUCED INTO FLORIDA.

REFERENCES: THE LITERATURE ON THIS SPECIES IS VERY EXTENSIVE. MANY PAPERS HAVE BEEN PUBLISHED SINCE THE BIBLIOGRAPHY OF 215 TITLES BY LEONARD IN 1931. ONLY THOSE CITED IN THE TEXT ARE LISTED HERE.

- ANDERSON, W. H. 1948. LARVAE OF SOME GENERA OF CALENDRIINAE AND STROMBOSCIERINAE. ANN. ENT. SOC. AMER. 41:413-437.
- BLACKWELDER, R. E. 1947. CHECKLIST OF THE COLEOPTEROUS INSECTS OF MEXICO, CENTRAL AMERICA, THE WEST INDIES AND SOUTH AMERICA. PART 5. U.S. NAT'L. MUS. BULL. 185:915.
- BULLOCK, R. C. AND E. EVERS. 1962. CONTROL OF THE BANANA ROOT BORER (COSMOPOLITES SORDIDUS GERMAR) WITH GRANULAR INSECTICIDES. TROP. AGR. 39:109-113.
- COMMONWEALTH INSTITUTE OF ENTOMOLOGY. 1968. DISTRIBUTION MAPS OF PESTS. SERIES A, MAP No. 41 (REVISED), COSMOPOLITES SORDIDUS (GERM.).
- HORD, H. H. V. & R. S. FLIPPIN. 1956. STUDIES OF BANANA WEEVILS IN HONDURAS. J. ECON. ENT. 49(3): 296-300.
- LEONARD, M. D. 1931. A BIBLIOGRAPHY OF THE BANANA ROOT WEEVIL, COSMOPOLITES SORDIDUS GERM. J. DEP. AGR. PUERTO RICO 15:147-176.
- LYLE, CLAY. 1947. ACHIEVEMENTS AND POSSIBILITIES IN PEST ERADICATION. J. ECON. ENT. 40(1):1-8.
- MOZNETTE, G. F. 1920. BANANA ROOT BORER. J. AGR. RES. 19(1):39-46; 13 FIG.
- NEWELL, WILMON. 1919. BANANA ROOT BORER. STATE PLANT BD. FLA. QUAR. BULL. 3(2):71-73, 95-96.
- NEWELL, WILMON. 1921. BANANA ROOT BORER. STATE PLANT BD. FLA. QUAR. BULL. 5(2):94-95.
- PIERCE, W. D. 1918. A MANUAL OF DANGEROUS INSECTS LIKELY TO BE INTRODUCED IN THE UNITED STATES THROUGH IMPORTATIONS. USDA, WASHINGTON, D. C. 256 P.; 49 PL.
- ROBERTS, F. S. 1958. INSECTS AFFECTING BANANA PRODUCTION IN CENTRAL AMERICA. PROC. 10TH INTERN. CONGR. ENT. 3:411-415.
- SIMMONDS, N. W. 1966. BANANAS. 2ND ED. LONGMAN'S, GREEN & CO., LONDON. XVI + 512 P.
- SLEEPER, E. L. 1957. NOTES ON THE CURCULIONOIDEA. 14. OHIO J. SCI. 57(1):38-42.
- STAMBAUGH, S. U. 1951. BANANAS IN FLORIDA. FLA. DEP. AGR., TALLAHASSEE. 77 P.
- WOLFENBARGER, D. O. 1965. BANANA ROOT BORER (COSMOPOLITES SORDIDUS) AND ITS CONTROL IN FLORIDA. AMER. SOC. HORT. SCI., CARIBBEAN REG. PROC. 12TH ANN. MEET. 8:67-70.
- ZIMMERMAN, E. C. 1968a. RHYNCHOPHORINAE OF SOUTHEASTERN POLYNESIA (COLEOPTERA: CURCULIONIDAE). PACIFIC INSECTS 10(1):47-77.
- ZIMMERMAN, E. C. 1968b. COSMOPOLITES PRUNINOSUS, A NEW PEST OF BANANA. J. ECON. ENT. 61(3):870-871.