ENTOMOLOGY CIRCULAR No. 122
JULY 1972

FLORIDA DEPARTMENT OF AGRICULTURE & CONSUMER SERVICES
DIVISION OF PLANT INDUSTRY

EUROPEAN CORN BORER, *OSTRINIA NUBILALIS* (HÜBNER), DETECTION METHODS

(LEPIDOPTERA: PYRAUSTIDAE [1])

F. W. MEAD

GENERIC SYNONYMS: *PYRALIS*, *PERINEPHELA*, *BOTYS*, *PYRAUSTA*, *MICRACTIS*, *ANANIA*.

INTRODUCTION: THERE HAVE BEEN SEVERAL INTERCEPTIONS OF THE EUROPEAN CORN BORER IN FLORIDA BUT TO DATE NO INFESTATIONS HAVE BEEN DETECTED. HOWEVER, IN THE LAST 15 YEARS THE BORER HAS MOVED SOUTHWARD IN ALABAMA AND GEORGIA AND NOW OCCURS IN SEVERAL COUNTIES ADJACENT TO FLORIDA. SPARKS AND YOUNG (1971) STATED THAT THE EUROPEAN CORN BORER IS PROBABLY LOCATED IN ALL COUNTIES OF EXTENSIVE CORN PRODUCTION IN GEORGIA AND THAT IN SOUTH GEORGIA IT IS BECOMING A PEST OF INCREASING ECONOMIC IMPORTANCE ON CORN, MILLET, SOUTHERN PEAS, AND SORGHUM. THESE SAME CROPS ARE IMPORTANT IN FLORIDA ALSO. OVER 200 PLANTS ARE RECORDED AS HOSTS OF THE BORER, INCLUDING GRAIN, VEGETABLES, FLOWERS, AND WEEDS.

IDENTIFICATION: WINGSPREAD APPROXIMATELY 1 INCH. THE WINGS OF THE FEMALE (FIG. 2 AND 3) ARE USUALLY PALE YELLOW BUT VARY FROM WHITISH TO LIGHT BROWN. THE OUTER THIRD OF THE WINGS IS USUALLY CROSSED BY TWO DARK ZIGZAG LINES. THE MALE (FIG. 1) HAS A DIFFERENT APPERANCE FROM THE FEMALE IN THAT THE MALE IS HEAVILY OVERLAID WITH BROWN BUT USUALLY HAS THE OUTER THIRD OF THE WINGS CROSSED BY TWO ZIGZAG STREAKS OF PALE YELLOW AND OFTEN THERE ARE PALE YELLOW AREAS ON THE FOREWINGS. CLOSELY RELATED SPECIES: FEMALES OF *OSTRINIA NUBILALIS* ARE DIFFICULT TO SEPARATE FROM THOSE OF *OSTRINIA* (= *PYRAUSTA*) *PENITALIS* (GROTE), AN AQUATIC SPECIES WIDELY DISTRIBUTED IN FLORIDA, THAT BORES IN BUDS, FRUITS, AND STEMS OF VARIOUS NYMPHAEACEAE. *O. NUBILALIS* FEMALES ALSO ARE VERY SIMILAR TO THOSE OF THE SMARTWEED BORER, *OSTRINIA OBUMBRATALIS* (LEDERER) (= *PYRAUSTA AINSLEI* HEINRICH), A SPECIES PROBABLY IN FLORIDA BUT NOT LISTED AS SUCH BY MUTUURA AND MUNROE (1970) IN THEIR REVISION OF *OSTRINIA*. HOSTS OF THE SMARTWEED BORER INCLUDE *POLYGONUM* SPP.; RAGWEED, *AMBROSIA* SPP.; WILD PARSNIP, *PASTINACA SATIVA*; AND OCCASIONALLY MAIZE, *ZEA MAYS*. NO OTHER SPECIES OF *OSTRINIA* WOULD BE PERTINENT TO FLORIDA UNLESS INADVERTENTLY INTRODUCED. A KEY TO ADULT *OSTRINIA* OF THE WORLD HAS BEEN PROVIDED BY MUTUURA & MUNROE (1970). SEVERAL OTHER MOTHS MIGHT BE CONFUSED WITH THE EUROPEAN CORN BORER, SO SUSPECT SPECIMENS SHOULD BE SUBMITTED TO A SPECIALIST. CONFIRMATION BY APPROPRIATE STATE OR FEDERAL AUTHORITY IS A REQUIREMENT IN FLORIDA IF POSITIVE IDENTIFICATION WOULD RESULT IN A QUARANTINE OR RESTRICTIVE REGULATORY ACTION. EGGS OF *O. NUBILALIS*: THE FEMALES LAY EGGS IN GROUPS OF 5 TO 55 ON THE UNDERSIDE OF THE LEAVES, ESPECIALLY ON THE LOWER LEAVES OF YOUNG PLANTS, PREFERABLY CORN. EACH EGG IS ABOUT HALF THE SIZE OF A PINHEAD AND THEY OVERLAP EACH OTHER AS DO FISH SCALES (FIG. 4). THEY ARE WHITE WHEN FIRST LAID, CHANGE TO PALE YELLOW, AND BECOME DARKER BEFORE HATCHING WHEN THE DARK BROWN HEADS OF THE BORERS INSIDE CAN BE PLAINLY SEEN (FIG. 5). USUALLY THE EGG MASS IS NOT DEPOSITED UNTIL THE WHORL OF YOUNG CORN IS AT LEAST ONE FOOT HIGH. THERE IS A TENDENCY TO OVIPOSIT PRIMARILY ON THE UNDERSIDE OF A CORN LEAF NEAR THE MIDRIB ON THE BASAL THIRD OF THE LEAF ABOUT FOUR TO SIX LEAVES FROM THE BOTTOM. LARVAE OF *O. NUBILALIS* (FIG. 5 AND 6): FULL GROWN LARVAE ARE ABOUT 1 INCH LONG AND 1/8 INCH IN DIAMETER (MORE SLENDER THAN NOCTUID EARWORMS). THE HEAD IS DARK BROWN OR BLACK. THE UPPER PART OF THE BODY IS GRAY TO LIGHT BROWN OR PINK, AND HAS ROWS OF BROWN SPOTS AND SEVERAL BROWN OR PINK LINES EXTENDING LENGTHWISE. THE UNDERSIDE OF THE BODY IS CREAM COLORED AND HAS NO MARKINGS.

TO DISTINGUISH BETWEEN THE CATERPILLAR OF THE EUROPEAN CORN BORER AND THOSE POTENTIAL OR KNOWN SPECIES ATTACKING CORN IN FLORIDA, CONSULT DEKLE (1965). THE FIELD KEY TO CORN INSECTS BY METCALF AND FLINT (1962) IS USEFUL. ANY CATERPILLAR FROM CORN THAT HAS CROCHETS OF THE PROLEGS FORMING AN INCOMPLETE CIRCLE SHOULD BE SUBMITTED FOR IDENTIFICATION AS A POSSIBLE EUROPEAN CORN BORER. IN SOUTHERN STATES HAVING BOTH SOUTHWESTERN CORN BORER AND EUROPEAN CORN BORER, FIELD MEN SEPARATE LIVE LARVAE OF THESE SPECIES BY PRODDING THEM WITH A STICK. IF A LARVA BACKS UP (USES "REVERSE GEAR") IT IS THE EUROPEAN CORN BORER. PUPA: BROWN, 1/2 TO 5/8 INCH LONG; WITHOUT A FRONTAL HUMP; CREMASTER LONGER THAN BROAD (FORBES, 1923).

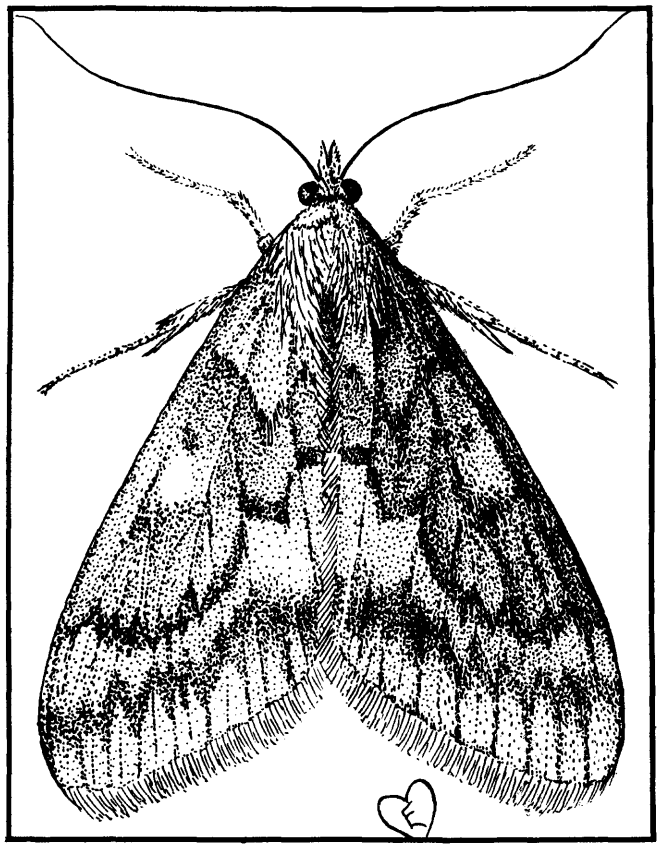

FIG. 3. ADULT ♀ EUROPEAN CORN BORER MOTH AT REST. (DRAWING). USDA PHOTO.

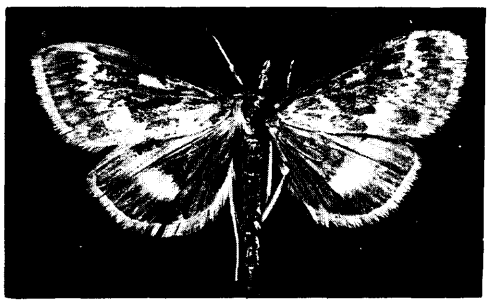

FIG. 1. ♂ EUROPEAN CORN BORER *OSTRINIA NUBILALIS* (HBN.). APPROX. 2X. USDA PHOTO.

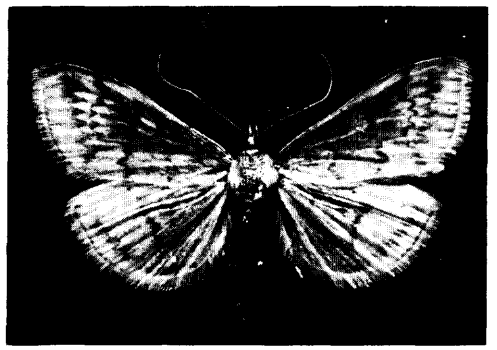

FIG. 2. ♀ EUROPEAN CORN BORER *OSTRINIA NUBILALIS* (HBN.). APPROX. 2X. USDA PHOTO.

[1] CONTRIBUTION NO. 241. BUREAU OF ENTOMOLOGY

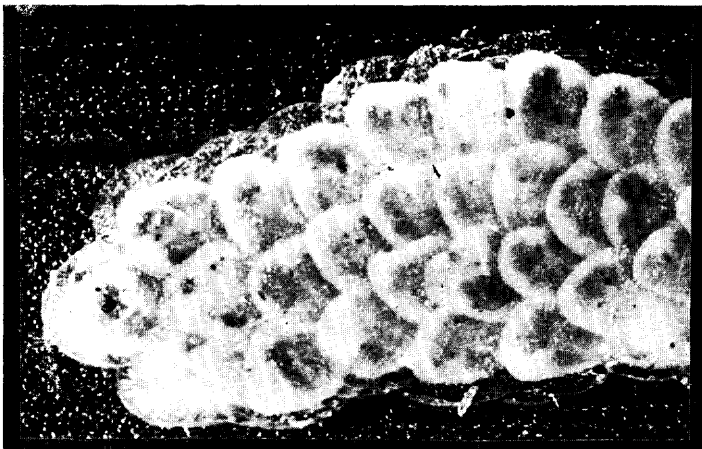

FIG. 4. EGGS, SOON AFTER BEING LAID, OF EUROPEAN CORN BORER, O. NUBILALIS. USDA PHOTO.

FIG. 5. EGGS IN BLACKHEAD STAGE ABOUT READY TO HATCH OF EUROPEAN CORN BORER, O. NUBILALIS. USDA PHOTO.

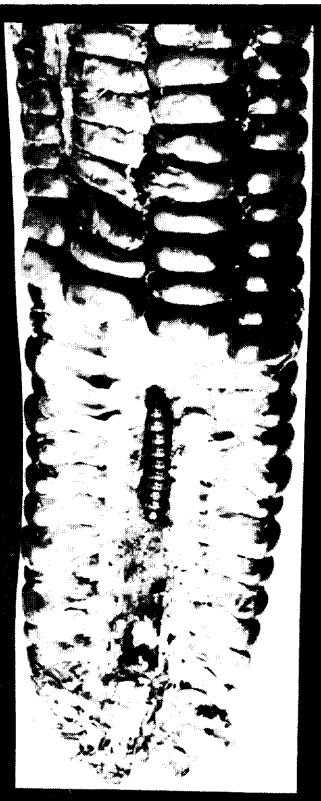

FIG. 6. LARVA OF EUROPEAN CORN BORER IN COB OF FIELD CORN.

FIG. 7. STALK AND EAR SHANK CUT OPEN TO SHOW EUROPEAN CORN BORER LARVAE AND THEIR FEEDING. BORING IN SHANK CAUSES EAR TO BREAK OFF AND DROP TO THE GROUND. USDA PHOTO.

BIONOMICS: TH EUROPEAN CORN BORER WAS A SINGLE GENERATION SPECIES IN THE UNITED STATES FOLLOWING ITS INTRODUCTION ABOUT 1917. SINCE THEN IT HAS BECOME A MULTIVOLTINE SPECIES IN MUCH OF ITS RANGE, THE NUMBER OF BROODS CORRELATED TO A GREAT EXTENT WITH LATITUDE AND WEATHER. BIOTYPES ADAPTED TO THE ENVIRONMENT OF THE DEEP SOUTH HAVE BEEN A KEY FACTOR IN THE SOUTHERN EXTENSION OF THE RANGE OF THE BORER. SPARKS AND YOUNG (1971) REPORTED THERE ARE AT LEAST FOUR GENERATIONS A YEAR IN SOUTH GEORGIA. DURANT (1969) FOUND FOUR GENERATIONS AT FLORENCE, SOUTH CAROLINA. A MAJOR CONCERN TO FLORIDIANS IS THAT BIOTYPES MAY EXIST WHICH COULD POSE A SERIOUS THREAT TO THE VERY IMPORTANT SWEET CORN PRODUCING AREAS OF CENTRAL AND SOUTH FLORIDA. DR. SPARKS CURRENTLY IS DOING RESEARCH ON BIOTYPES AT TIFTON, GEORGIA. LITERATURE ON BORER BIONOMICS IS VOLUMINOUS. SOME OF THE MORE PERTINENT PAPERS INCLUDE: RUFFIN AND EDEN (1956); USDA (1962); DURANT (1969); AND SPARKS AND YOUNG (1971).

DETECTION NOTES:

1. BEST MASS SURVEY TECHNIQUE IS TO DRIVE ALONG FIELDS AT TASSELING TIME, LOOKING FOR BROKEN OR BENTOVER TASSELS. TASSELS CAN BE BROKEN BY OTHER CAUSAL AGENTS, SO CONFIRM PRESENCE OF EUROPEAN CORN BORER BY SEARCHING FOR YOUNG LARVAE FEEDING IN TASSEL BUDS OR TUNNELING IN TASSEL STEMS OR BRANCHES; SAWDUST-LIKE FRASS USUALLY IS PRESENT AT BREAKS.
2. HEAVILY INFESTED STALKS MAY BREAK OVER AND COLLAPSE; USE LINOLEUM KNIFE AS PREFERRED TOOL TO SLICE OPEN STALKS (AND EAR SHANKS AND COBS) IN SEARCH FOR CATERPILLARS. IN FLORIDA THE FOLLOWING CATERPILLARS HAVE BEEN DETECTED IN STALKS: LESSER CORNSTALK BORER, CORN EARWORM, FALL ARMYWORM, SOUTHERN CORNSTALK BORER, AND SUGARCANE BORER. THE SOUTHWESTERN CORN BORER HAS NOT BEEN TAKEN IN FLORIDA, BUT IT HAS BEEN COLLECTED IN NEARBY COUNTIES OF SOUTHERN ALABAMA.
3. OTHER INDICATIONS OF ATTACK ARE SMALL AREAS OF SURFACE FEEDING ON THE LEAF BLADES, WITH FINE SAWDUST-LIKE CASTINGS ON THE UPPER SIDE OF THE LEAVES OR STALKS; SMALL HOLES IN THE STALKS OFTEN WITH SLIMY BORINGS PROTRUDING FROM THE HOLES; WORMS BORING THROUGH THE STEM AND ALONG THE ENTIRE LENGTH OF THE EAR AND COB.
4. LOOK OR FEEL FOR EGG CLUSTERS ON THE UNDERSIDE OF CORN LEAVES NEAR MIDRIB. ONE METHOD IS RUN CORN LEAF BETWEEN THUMB AND FOREFINGER, FEELING FOR SLIGHT BUMP CAUSED BY 1/4 INCH PATCH OF EGGS; CONFIRM WITH VISUAL CHECK BY TURNING UP THE UNDERSIDE OF CORN LEAF.
5. IN WINTER, CHECK OLD CORN FIELDS. OVERWINTERING FORM IS MATURE LARVA IN TUNNEL OF OLD STALK JUST ABOVE GROUND SURFACE. WHERE CORN HAS BEEN LEFT STANDING, LOOK ESPECIALLY IN LODGED STALKS.
6. INSTALL BLACKLIGHT TRAPS NEAR CORN FIELDS OR OTHER SUSPECTED HOST PLANTS. MOTHS FLY READILY AT NIGHT INTO THESE TRAPS.
7. CAUTION: ALL COMMERCIAL SWEET CORN IS SPRAYED EVERY DAY FROM SILKING TIME UNTIL HARVEST. ALL PERSONNEL SHOULD STAY OUT OF SPRAYED CORN FIELDS.
8. SPECIMENS OBTAINED IN THE FIELD MUST BE CONFIRMED BY COMPETENT AUTHORITY.

LITERATURE CITED:

DEKLE, G. W. 1965. ILLUSTRATED KEY TO CATERPILLARS ON CORN. FLORIDA DEPT. AGR., DIV. PLANT INDUSTRY BULL. 4:1-14.

DURANT, J. A. 1969. SEASONAL HISTORY OF THE EUROPEAN CORN BORER AT FLORENCE, SOUTH CAROLINA. J. ECON. ENT. 62(5):1071-5.

FORBES, W. T. M. 1923. THE LEPIDOPTERA OF NEW YORK AND NEIGHBORING STATES. PRIMITIVE FORMS. MICROLEPIDOPTERA. PYRALOIDS. BOMBYCES. CORNELL UNIV. AGR. EXP. STA. MEM. 68:1-729.

METCALF, C. L., AND W. P. FLINT. 1962. (4TH ED., REVISED BY R. L. METCALF). DESTRUCTIVE AND USEFUL INSECTS. MCGRAW-HILL BOOK CO., INC., NEW YORK. 1087 P.

MUTUURA, A., AND E. MUNROE. 1970. TAXONOMY AND DISTRIBUTION OF THE EUROPEAN CORN BORER AND ALLIED SPECIES: GENUS OSTRINIA (LEPIDOPTERA: PYRALIDAE). ENT. SOC. CANADA MEM. 71:1-112.

RUFFIN, W. A. AND W. G. EDEN. 1956. THE EUROPEAN CORN BORER IN ALABAMA. ALABAMA POLYTECHNIC INST. EXT. SERV. CIRC. 490:1-10.

SPARKS, A. N., AND J. R. YOUNG. 1971. EUROPEAN CORN BORER ACTIVITY IN GEORGIA. J. GEORGIA ENT. SOC. 6(4):211-215.

U. S. DEPARTMENT OF AGRICULTURE. AGRICULTURAL RESEARCH SERVICE. ENTOMOLOGY RESEARCH DIVISION. 1962. THE EUROPEAN CORN BORER, HOW TO CONTROL IT. FARMERS' BULL. 2190:1-20.