

REVIEW OF DISTRIBUTION, BIOLOGY AND CONTROL METHODS
OF SIX MAJOR INSECT PESTS OF CORN IN
THE UNITED STATES

by

EULOGIO R. ZANABRIA

B. S., Universidad Nacional Tecnica del Altiplano
Puno, Peru, 1970

A MASTER'S REPORT

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Department of Entomology

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1976

Approved:



Major Professor

LD
2665
R4
1976
Z35
c.2
Document

317

TABLE OF CONTENTS

INTRODUCTION	1
LITERATURE REVIEW	5
European Corn Borer	5
Distribution and Abundance in the U.S.A.	5
Taxonomic Status	6
Biology, Ecology and Behavior	7
General Description of the Insect	7
Life History	8
Mating and Pheromone Studies	10
Diapause Studies	12
Ecotypes of the Corn Borer	14
Host Range	15
Damage and Losses	16
Control Measures	17
Biological	17
Parasitoids	17
Predators	18
Pathogens	19
Host Plant Resistance	20
Cultural Practices	21
Mechanical and Physical	22
Light traps	22
Sterile-male technique	22
Use of Chemicals	23
Western and Northern Corn Rootworms	25
Distribution and Abundance in the U.S.A.	25
Taxonomic Status	26
Biology, Ecology and Behavior	27
General Description of the Insects	27
Life History	28
Mating and Pheromone Studies	31

Interspecific Relationship of the Two Species	32
Host Range	32
Damage and Losses	33
Control Measures	34
Biological	34
Host Plant Resistance	35
Cultural Practices	37
Chemical Control	38
Corn Earworm	40
Distribution and Abundance in the U.S.A.	40
Taxonomic Status	41
Biology, Ecology and Behavior	41
General Description of the Insect	41
Life History	42
Mating and Pheromone Studies	45
Diapause Studies	46
Host Range	47
Damage and Losses	47
Control Measures	48
Biological	48
Host Plant Resistance	51
Cultural Practices	53
Mechanical and Physical	53
Light traps	53
Sterile-male technique	53
Use of Chemicals	54
Fall Armyworm	55
Distribution and Abundance in the U.S.A.	55
Taxonomic Status	56
Biology, Ecology and Behavior	56
General Description of the Insect	56
Life History	57
Mating and Sex Attractants	59
Host Range	61

Damage and Losses	61
Control Measures	63
Biological	63
Host Plant Resistance	64
Cultural Practices	65
Mechanical and Physical	66
Use of Chemicals	66
Southwestern Corn Borer	68
Distribution and Abundance in the U.S.A.	68
Taxonomic Status	69
Biology, Ecology and Behavior	70
General Description of the Insect	70
Life History and Habits	71
Mating Habits and Sex Attractant Studies	74
Diapause Studies	75
Host Range	77
Damage and Losses	77
Control Measures	79
Biological	79
Host Plant Resistance	80
Cultural Practices	81
Use of Chemicals	82
SUMMARY AND CONCLUSIONS	84
ACKNOWLEDGMENTS	88
LITERATURE CITED	89
APPENDIX	116

INTRODUCTION

Corn (Zea mays L.) grows over a wider geographical range and over a wider range of environments than any other cereal. Corn ranks second in world cereal production and third in production among the developing countries (Hanson 1974).

The United States is first in corn production in the world. Among the American grain crops, corn ranks at the top in acreage, in tonnage, and in total value of production (Anonymous 1975h; Butz 1973). The latest statical data show a corn yield for grain of 4,651,167,000 bushels, which is equivalent to a current monetary value of \$13,716,772,000 (Anonymous 1975g).

Corn is grown throughout the United States. However, the major region is the "Corn Belt" of the North Central Region, centering in Iowa, Illinois, and Indiana, and including adjoining states. For the past 3 years, the leading states in corn grain production have been Iowa, Illinois, Nebraska, Indiana, and Minnesota. These five states produced 62 percent of the total grain in 1974 (Anonymous 1975h).

In Kansas, for many years corn for grain production was largely limited to the northeastern part of the State which comprises the southwest edge of the Corn Belt. But gradually irrigation has increased corn acreage from, for example, a yield of 62,100,000 bushels in 1963 to 131,480,000 bushels in 1974, largely as the result of irrigation in southwestern Kansas (Anonymous 1975g).