

## INTRODUCTION

Maize was the main food of the Indians before Columbus discovered America and still is the staple food for Mexico, Central America and some South American countries (Poehlman, 1959).

The main producer of maize is the United States although it is widely cultivated in Southern Europe, Africa and Asia (Purseglove, 1966).

Maize is used for production of starch, oil, syrup, alcohol as well as in animal nutrition (Wallace, 1938).

Hybrid or improved maize is more susceptible to plant diseases and noxious insects than the local varieties raised throughout the centuries for their resistance to pests. Intensive cultivation of the crop also increases the opportunities for pest damages (Muller 1961).

Different trials in pest control have been carried out wherever maize grows. Biological control has been established with different results, and some species of braconids have given attractive results for Laphygma frugiperda (S. & A.) and Heliothis zea (Boddie) in the United States (Buttler, 1957). In addition, Diatraea is controlled by Trichogramma sp. and Ixophaga diatraeae (Tns.) (Van Whervin, 1963).

The economic importance of losses in corn due to pests is well known. In southern United States the losses by borers reach 33 to 71 per cent in infested fields (Arbuthnot, 1958). In trials done with maize for Laphygma frugiperda control in Colombia, the difference between treated and untreated plots was 29% in yield (Rupel, 1957). In El Salvador untreated plots infested with Laphygma frugiperda, Heliothis zea and Diatraeae gave only one thirteenth of the yield of the best treatment (Mena, 1965).

The efficiency of the insecticide is greatly affected by diluted formulations. Adjuvants are materials used to improve the action of the insecticides. For spray uses there are two main types of adjuvants known as stickers and wetters.

- a) Stickers. One of the most serious troubles in spray applications under tropical conditions is the loss of insecticides by water run-off, therefore the insecticidal action may depend on the amount of rainfall and larger quantities of insecticide would be necessary to counteract the short period of the effect. Stickers give more tenacity to the insecticide, improving the retention of the deposits upon the leaves (Martin, 1964). Unfortunately, the good dispersibility and spreading properties over the surface of the foliage may be antagonistic to good adhesion.
- b) Wetters. Most of the insecticides are not water soluble and they are applied as suspensions or emulsions. To make an emulsifiable concentrate, the pesticide is dissolved in an oily organic solvent and an emulsifying agent is added. However, sometimes this agent is not enough to get a suitable distribution on the surfaces, and it is necessary to add another material to increase the stability of the emulsion or to decrease the tendency for the two emulsion faces from separating easily. This type of material is called a wetter. This material determines the ultimate stability and behavior of the emulsion (Metcalf Flint, 1962; Jones, 1964).