THE ROLE OF SEX PHEROMONES IN THE CONTROL OF THE OLIVE FRUIT FLY,

*DACUS OLEAE*: PRESENT STATUS - PROSPECTS

George E. Haniotakis
Biology Dept, N.R.C. "Demokritos"
P.O. Box 60228
GR-153 10 Aghia Paraskevi, Greece

ABSTRACT

Since 1981, when synthetic sex pheromones of *Dacus oleae* became available, much effort has been made toward their use in the control of this pest. A brief review of background information pertaining to this subject is presented here. Attempts at practical use of *D. oleae* pheromones include: monitoring, mass trapping and mating disruption. Although definite correlation of pheromone trap catches and olive fruit infestation has been reported, pheromone traps are not used yet for monitoring wild populations. Mass trapping, after its 5-year development process, today shows good possibilities of success. Although mass trapping in its present form cannot replace current control practices, it is expected that improvement of trap efficiency and establishment of optimal trap densities will make this goal possible in the near future. Mating disruption is still at the preliminary stage, though some encouraging results have been reported.

INTRODUCTION

The olive fruit fly, *Dacus oleae* Gmelin, is a major pest of olives in the Mediterranean region and Near East, where olive growing is one of the most important components of agriculture and where 98% of table olives and olive oil is produced. The damage is caused by larvae which bore and feed inside the olive fruit. The losses, both quantitative and qualitative, are due to the consumption of part of the fruit as well as to fruit drop, and can be as high as 80% or more of production, if no control measures are taken. Present control measures include:

a) Preventive method: This consists of bait sprays applied from the ground or the air. Baits consist of protein hydrolysates and...
organophosphorus insecticides. Sprays are effective against the adult stage only. Timing is therefore of great importance for elimination of the maximum number of females prior to oviposition. Timing is based today on catches of McPhail traps baited with ammonium salt solutions. The economic threshold level for bait sprays is one fly per trap per day except for the first application in the early summer when other parameters are taken into consideration, including sex ratio, female fecundity and fruit development. Bait sprays are not effective at the orchard level. Area-wide applications are required which are usually undertaken by governmental or cooperative organizations.

b) Therapeutic method: This consists of cover sprays from the ground with organophosphorus insecticides. It is effective against all insect stages with a residual activity of 10-15 days depending on the insecticide used. Economic threshold level for cover sprays is considered a 5% fruit infestation for Greece and 10-15% for Italy. Accurate fruit sampling is important in this case. This method is effective at the orchard level and is usually used by individual olive growers for their own protection.

The ecological and toxicological consequences of prolonged use of wide-spectrum insecticides over large areas, as is the case with air bait sprays and cover sprays as well as the scarcity and high cost of farm labor, in the case of ground bait and cover sprays, have encouraged scientists in all interested countries to seek alternative control methods. The discovery of a powerful sex attractant for male olive fruit flies which became readily available after its identification and synthesis, has stimulated research aiming at its use for monitoring and control of this pest.

The work which has been done on this subject up to the present will be reviewed here, as well as its present practical status and future prospects.

BACKGROUND INFORMATION

The utilization of pheromones in the mating process of D. oleae was suspected by Schultz and Boush (1971) and Economopoulos et al. (1971). The presence of a sex attractant pheromone in this species was demonstrated in laboratory (Haniotakis, 1974) and field (Haniotakis, 1977) experiments. It is released by female flies and acts as a potent male attractant. It was found to consist of a mixture of four components (Mazomenos and Haniotakis, 1981, 1985), three of which (a-pinene, n-nonanal and ethyl dodecanoate) were known substances and