Wild onion flies emerge from hibernating pupae in May and June. As their longevity is only a few weeks, sterile flies are released every 1 - 2 weeks during this period on each field. The data from the catches are used to adjust and optimize the distribution of the next batch of sterile flies. A second flight is in July and August, generally causing no damage. Sterile flies are also released against this generation to get a further population reduction and also to get a rough estimate of their offspring, the hibernating pupae. In the spring the flies redistribute themselves over the newly sown onion fields.

Apart from some growing pains in mass-rearing and release techniques, the main problems in application arose near fields where onion maggots were chemically controlled but the fly populations were not sufficiently reduced. This was due to use of an insufficient dose and/or use of non-effective insecticides. Sometimes no control was applied. Increased populations on such fields spread the next spring to surrounding fields of our customers. We excluded customers if advanced fly population estimates exceeded levels that we could afford to control by sterile flies. In cases where we were taken by surprise, sometimes some damage resulted when we could not, or not in time, achieve a sufficient over-flooding of sterile flies. In both cases, this impaired the reliability of the sterile insect technique in the farmer's view. Therefore, participation did not exceed about 60%. More importantly, the planned population reduction could only regionally or temporarily be achieved, so we missed the expected cost reduction. Thus, the acreage treated remained around 1,200 ha/year from 1983 up till now, 1989, and the method is still unprofitable.

From 1970 onwards, onion maggots were effectively controlled by trichloronate, however, its production was stopped a few years ago. Now some carbamates are used which are somewhat less effective. Moreover, some of these are rapidly broken down by soil bacteria after a few applications. If this should happen also to benfuracarb, which is now the only insecticide available for use against the onion fly for the majority of the Dutch onions, the SIT will be very seriously threatened. In areas where participation is well below 100%, onion fly populations will become too high. Our prices are at present lower than those of the chemical alternatives, but because we will have to raise them, a high level of participation does not seem probable.

Thus the prospects for use of sterile onion flies remain uncertain due to present and expected problems.

B. Nuclear Strategies in Food and Agriculture - 25 Years of Progress, 1964-1989

Björn Sigurbjörnsson, Director, Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture

Healthy and abundant food supplies is a goal for every nation in the world. Nuclear techniques have played a fundamental role in solving some of the obstacles to attaining this goal which existed in the 1960s. New trends and approaches in food and agricultural production have had a tangible impact on the quality of life of people worldwide.

Research, testing, analysis and experience in the peaceful applications of nuclear energy have helped solve many practical problems for farmers and industry alike.

Unfortunately, however, not all successful nuclear applications available to industrialized countries reach developing nations. To address this problem, in 1964, the International Atomic Energy Agency (IAEA) and the Food and Agriculture Organization (FAO) of the United Nations joined forces to create the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture.

Initially just a small unit seeking solutions to food and agriculture problems through nuclear techniques, the Joint Division, and the Agricultural Laboratory of the IAEA Seibersdorf Laboratories, have since grown to be an internationally respected research and development centre, a forum for global sharing of information and knowledge, and a conduit through which nuclear technology can be transferred to those countries which need it most.

The Joint FAO/IAEA Division today focuses on six major areas:

Insect and pest control nuclear techniques are used to control or eradicate harmful pests responsible for extreme losses in food production, as well as in human and animal life, through dangerous diseases.

Food preservation through irradiation has become a valuable tool in reducing post-harvest food losses, reducing the occurrence of food-borne disease, and extending the shelf life of agricultural commodities.

Animal production and health is an area where nuclear techniques have been used successfully to improve the health and productivity of ruminant animals.

Plant breeding and genetics is an approach where nuclear techniques are used to develop new strains of plants of higher quality, yields, and resistance to diseases. These techniques induce genetic variation.

Soil fertility, irrigation and crop production covers the important combinations of healthy, productive soils and an adequate supply of water necessary to achieve good quality crop production. Nuclear techniques are used to improve the efficiency of fertilizers, to understand their environmental effects, and to establish new ways to restrain their use.

Agrochemicals and residues are watched through radiotracer techniques as they travel through our environment. More effective applications of pesticides can be devised, as well as new approaches to understand and protect the ecological balance.

As the Joint FAO/IAEA Division completes its 25th year in operation, it is an opportune time to review some of the achievements of nuclear methods applied to food and agricultural production. Some of these are quite remarkable and have set valuable precedents in research, development, and applications for nuclear strategies and their role in solving food and agricultural problems in a practical, efficient manner.