Introduction of methyl bromide alternatives in strawberry, pepper and eggplant in Turkey

Ahmet Uludag, Ministry of Agriculture, Plant Protection Research Institute, ADANA
Seral Yucel, Cukurova University, Agricultural Faculty, Plant Protection Department, ADANA
Halil Elekcioglu, Adnan Menderes University, Agricultural Faculty, Plant Protection Department, AYDIN
Seher Benlioglu, Gaziantep University, Biology Department, GAZIANTEP

1. INTRODUCTION

Agriculture continues to have an important place in the Turkish economy, providing 14,6% of Gross Domestic Product (GDP). About 45% of the population is involved in agriculture. Vegetables and strawberry account for a considerable proportion of the agricultural production. Most of the vegetable production is consumed domestically, while strawberry is exported. In the project implementation area of the East Mediterranean Region, eggplant, pepper and strawberry production amounts to 115 000 Mt, 182 000 Mt, and 25 000 Mt, respectively. In Aydın Province 10 000 Mt of strawberries are produced.

The East Mediterranean region, consisting of Adana, Içel and Hatay province, is an important agricultural region of Turkey. This area comprises mainly the "low plain" of Çukurova and Amik plain, an alluvial land through which the rivers Seyhan, Ceyhan and Asi pass. It covers an area of about 38 600 km^2. The soil consists of sandy clays or loams with relatively low organic matter (<3%) and pH 7. The climate is typically mediterranean to subtropical; because of intense irrigation, it is very humid during summer months. A considerable part of this area is irrigated from storage lakes formed from the rivers. Climatic conditions and irrigation facilities allow a wide range of crops to be grown in the Region. Protected cultivation is particularly extensive and has an important place in the Region's agriculture.

The main problems restricting protected cultivation of vegetables in the East Mediterranean Region are soil borne pathogens (such as *Fusarium* spp., *Verticillium* spp., *Phytium* spp., *Phytopthora* spp.) root-knot nematodes (*Meloidogyne incognita, M. javanica* and *M. arenaria*), weeds and insects. The major problem restricting strawberry production in the East Mediterranean Region arises from soil borne fungi such as *Rhizoctania solani*. In addition, some weed, nematode and insect species create problems in the protected cultivation areas.

MB is registered in Turkey for quarantine measures, commodities and soil fumigation. Although the Turkish Government attempted to reduce MB usage in 1994, this was not well accepted by the farmers, due to its quick and deep soil penetration, biocidal effects on soil-borne fungi, nematodes, some bacteria and weeds. The consumption of MB has normally ranged annually between 600-900.

Methyl Bromide is extensively used in the East Mediterranean region against soil-borne pest complexes in protected vegetable cultivation. Potential alternative techniques to replace MB have been identified but use of alternatives by farmers in Turkey is not common because those techniques have not been introduced and farmers do not know how to use them. In the case of strawberry production under protected conditions in the East Mediterranean Region, MB is extensively used, and the farmers think of no other alternatives. Although there

are no precise statistical data on MB usage, it is estimated that MB consumption is about 150 Mt in pepper, eggplant, and strawberry production in the East Mediterranean Region.

In Aydin province, in 1994, 220 hectares were cultivated in greenhouses and 4,113 Mt of strawberries were produced. By 1998, 306 hectares were cultivated and over 10,207 Mt of strawberries were obtained with a little MB consumption. It is expected that the use of MB will increase in the next few years as the strawberry growing continues to expand in Aydin.

2. OBJECTIVES

The objectives of this project are:

1. To demonstrate the technical and economic feasibility of alternative pest control methods for methyl bromide (MB) in the East Mediterranean Region where protected cultivation (strawberry, pepper and eggplant) is extensively carried out, and Aydin Province where strawberry is produced.
2. To develop and implement a training and extension program, to transfer the best and most cost-effective technological approaches to 50 % of MB users (ca 4% of farmers) in these sectors.
3. To develop policy measures and an information program to ensure that 150 Mt of MB is permanently phased out in these specific sectors.

3. PROJECT DESCRIPTION

This project has three main parts:

Part 1: Demonstrations in year 1 to evaluate the techniques and identify the most suitable, cost-effective alternatives. Demonstrations of selected alternatives will be carried out in year 2 as part of the development of the training program (below);

Part 2: Development and implementation of a program for training, technical advice, technical information dissemination and technology transfer; development will take place in year 2, and the program will be implemented in years 2 and 3.

Part 3: Concurrent with Parts 1 and 2, the development of policy measures and an awareness raising program, to ensure that MB phased-out by this project will be permanently eliminated.

4. IMPLEMENTATION

Eleven demonstrations were conducted in strawberry, pepper and eggplant growing ereas of the East Mediterranean Region, and 6 demonstrations in strawberry in the Aydin Province.

Combination of solarization with Basamid at the rate of 400 kg/h, organic matter (chicken manure) at the rate of 1 kg/m^2 were applied at all experiments, but some other treatments such as straw (500 kg/ha) and trap plants (Tagetes spp.) were applied in some fields. *Trichoderma* spp. will be applied firstly, at the planting, then periodically once in a month.

Soil samples for physical, pathogens, nematode and weed seed analysis were taken and analysis have been already started.

Experiments have been monitoring both research and extension staff.

It has been observed that farmers are really interested in alternative methods. Furthermore, some of them applied alternative methods to the rest of their greenhouses apart from our applications.