REDUCING THE USAGE OF METHYL BROMIDE FOR SOIL DISINFESTATION IN ITALY: PRESENT SITUATION AND PERSPECTIVES

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1. Introduction

International regulation about reduction of global application of methyl bromide (MB) in agriculture, particularly in order to curb its emission into the atmosphere, forces to revise many horticultural cropping systems. The anticipation of the phasing out date to 2005 complicated the work of extension service, particularly because technological innovation spreads slowly and with many difficulties.
In this paper the Italian situation is summarised, with special attention to growers needs.

2. Present uses of MB in Italy

Many horticultural and floricultural crops still rely on MB, among those strawberry grown in open field and tomato, pepper, eggplant, gerbera and sweet basil grown in greenhouse. Since 1995, virtually impermeable films (VIFs) have been adopted to reduce MB emissions into the atmosphere. VIFs are now applied in many crops, particularly because fumigators are interested to reduce MB dosages maintaining its efficacy.
The main problems linked to the use of VIFs are:

[high cost
[industrial production: few industry are involved in their production; moreover their characteristics are not always optimal, particularly from a practical point of view (reduced possibility of choice of different sizes, mechanical properties, ..)

VIFs offered a short term solution, by permitting to comply the first 25 % reduction of MB consumption required by EU regulation by 01/01/1998, maintaining a good efficacy in terms of disease control.

3. MB alternatives

Italian researchers and extension services are trying to implement alternatives such as adoption of new growing systems, application of physical measures of soil disinfestation and any possible combination of different methods.

3. 1. Soilless cultivation

It is a suitable alternative for some ornamentals crops such as rose, gerbera and carnation, with good results from a technical and economic point of view. Also some vegetables are now grown soilless: since 1993 in northern Italy, near Verona, there are about 40 Ha of strawberries grown in an open soilless system.
Major difficulties are:

[high cost
[difficulties of fertilisation management
[recycling of used (worn-out) substrates
[environmental impact caused by nutrient solutions in open systems

3. 2. Steam

Steaming is frequently applied mostly in the floricultural industry, but the need of reducing the usage of MB did not cause an increased application of steam, due to:

high cost (twice in comparison to MB fumigation)

reduced number of applicators

environmental impact caused by a very drastic procedure that can determine a "biological vacuum" and manganese toxicity.

3. 3. Soil solarization

Soil solarization in Italy can be applied with good results in greenhouse, while in open field its effectiveness is strictly dependent on weather conditions, with best results in southern Italy. Generally Italian growers use soil solarization on crops with few critical soilborne problems (i.e. zucchini grown in central Italy under greenhouse).

Some growers also use soil solarization for sweet basil, heavily damaged by various soilborne pathogens. The main obstacle to the implementation of soil solarization is the length of soil mulching (4 weeks). For this reason, also in Italy the combination of 2 week of solarization with other soil disinfestation methods has been tested. In Italy few growers are now applying soil solarization particularly because many crops are grown during the hot season, but also because it is considered a complicated and not sure disinfestation system.

3. 4. Other chemical compounds

Dazomet and metham sodium (MIT generators) and 1,3 dicloropropene (1,3 D) are registered for use in Italy. Other chemicals, such as chloropicrin or formaldeyde registered in ohter countries, cannot be used at present. 1,3 D can only be applied in the open field. Although alternative fumigants represent the first grower's choice as MB replacement, the technical results achieved are generally inferior to those obtained with MB.

3. 5. Resistant rootstock

Cultivars resistant to soilborne pathogens are widely adopted whenever possible.

Major problems are caused by continuos evolution of pathogen races and by changes in customer requirements: this makes difficult for seed companies to continuously develop new resistant cultivars. An interesting application is the utilisation of grafting. In this case the main difficulty is caused by reduced availability of informations about compatibility between rootstock and cultivated cultivar and, particularly, by the high cost of grafted plants. Grafting is particularly used for tomato, melon, watermelon, eggplant.

3. 6. Biological control agents

The application of biological control agents against soilborne pathogens can be adopted for many crops; in general BCA, available for growers, are characterised by high rhizophere competence because their activity is principally localised on the plant roots. Actually, major problems for application of BCA are

reduced availability on the market

difficulties in industrial formulation of BCA

narrow spectrum of activity

necessities of good knowledge of pathogen epidemiology

need of their application in disinfested soil.

For these reasons BCA are not a realistic and applicable alternative to MB application in many cultural situation. However, they can be used in combination with other alternative methods.

4. A grower survey

The Italian situation shortly described underlines many difficulties in the process of phasing out MB. While growers of Northern Europe can more easily replace MB with steam and soilless cultivation, the same is not always economically sustainable in Southern Europe. The reduction of MB application can affect growers' competitiveness on the world market, particularly because developing countries of the Mediterranean basin will be allowed to use MB up to 2015. Those countries are still increasing MB consumption, particularly for soil disinfestation.

During 1997, a survey was conducted in order to know the situation of application of MB and of possible alternatives for Italian growers. In 1996, about 90% of growers carried out soil disinfestation and about 80% of them used MB. Italian growers do not seem much interested to alternatives to MB; only 20% of them consider their use possible in the practice. Only 20% of growers consider to reduce MB application up to 50% of current use. However, about 90% of them are favourable to the utilisation of VIF. MB is considered critical for tomato, pepper, eggplant and strawberries. For cut flowers, others system are available, such as soilless cultivation, steaming. For 30% of growers cucurbits and leafy vegetables do not necessarily depend upon MB.

5. Conclusions

Soil disinfestation remains a crucial practice in intensive systems and replacement of MB is difficult. Extension service is facing a very difficult task, helping grower in the implementation of more complicated methods.

There are not single alternative strategies valid for all crops, particularly because in many cases they must be economically and technically acceptable and applicable by growers, who maintain their competitiveness on the national and international market. Only a strong cooperation among researchers, extension service and growers will help implementing the available alternative strategies, without affecting Italian vegetable and ornamental industry.

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