BRIEF COMMENTS ON VARIOUS VIEWPOINTS REGARDING THE AVAILABILITY OF ALTERNATIVES TO METHYL BROMIDE IN AFRICA

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Introduction

The 1994 Report of the Methyl bromide Technical Options Committee (MBTOC) lists important uses of methyl bromide in Article 5 countries. These uses mainly include:

* fumigation of soil (nursery and seed bed) for production of cash crops for export to the developed countries
* fumigation of durables for both export commodities and for export commodities and for in-country storage of food-stocks such as cereal grains
* fumigation of perishables prior to export to meet quarantine requirements of the importing country
* fumigation of structures such as mills, warehouses, food processing operations, and transport vehicles including ships, aircraft, railway wagons and trucks.

The MBTOC report further provides a list of alternatives to methyl bromide for each of the above specific uses. However, the report clearly states that these alternative materials or technologies may require substantial development and research to be cost-effective, available, and applicable to the special needs of the Article 5 countries. This implies that the list of identified alternatives to methyl bromide reported in the MBTOC report was provisional and that there was no evidence to suggest that all identified alternatives had been evaluated under Article 5 countries to determine their efficacy with respect to specific target pests, ease of application, relevance to climatic conditions, and for their commercial and economic viability.

Since the submission of the MBTOC report, several case studies have been published indicating that there are a considerable number of alternatives in existence that may replace methyl bromide in some specific cases. Furthermore, some of these case studies have also highlighted an equally high number of alternatives at the developmental stage. There are, on the other hand, concern expressed by others, particularly the Article 5 countries, that the credibility of the of the reported case studies have only been confirmed in isolated countries where the initial studies were conducted. No attempts were made to follow and verify whether the results of these case studies were either reproducible or demonstratable in other countries. It is therefore concluded that these case studies, however fascinating they may appear, do not motivate farmers in Article 5 countries to adopt the listed alternatives.

In this paper, I have tried to offer some comments on various viewpoints regarding the availability of alternatives to methyl bromide in the fumigation of soils in Africa.

Fumigation of soils

Approximately, 70% of reported use of methyl bromide is in soil fumigation. Crops that are grown in soils treated with methyl bromide in Africa include pears, citrus, apples, guava, tobacco, cut flowers, asparagus, and strawberries (Schonfield et al, 1995).

Miller and Wilkinson (1995) investigations in Zimbabwe have indicated that existing or potential alternatives to methyl bromide for soil pest control Integrated Pest Management, cultural practices, crop rotation, deep plowing, cover crops and living mulches, timing of planting, plant nutrition and soil PH, soil substitutes (with natural or synthetic substrates such as rock wool, tuff stone, clay granules, volcanic pumice, waste materials (composting constitutes like livestock manure and wastes from agricultural food, etc.), solarization, steam heating, and chemical treatments (such as methyl isothiocynate, metam sodium, dazomet, chloropicrin, 1,3 dichloropropene, and ethylene dibromide). However, Miller and Wilkinson (1995) have also pointed out that most of these alternatives need further development before they are fully exploited. The implication here is obvious: no reliable alternative whose performance has been critically evaluated under the local conditions do really exist. Therefore, hasty adoption of these alternatives to replace methyl bromide without further research to confirm their effectiveness with respect to specific target pests, ease of application, relevance to climatic conditions, soils and cropping pattern, commercial and economic viability, may be disruptive to agricultural production. However, for countries in Africa, such as Zimbabwe have very limited research funds to investigate methyl bromide replacement. Therefore the search for alternatives to methyl bromide for soil fumigation is likely to be slow (Shonfield, et. al, 1995).

Shonfield et al (1995) have also provided a similar list of existing and potential alternatives to methyl bromide for fumigation of soil in the African region. As expected, they have similarly highlighted the same limitations in use of these alternatives by stating that the alternatives still require further research and development.

Discussions:

One of the basic requirement of the Montreal Protocol is that an ozone depleting substance shall be phased out once an alternative to replace the substance is available. Anxious to phase out methyl bromide because of its ozone depleting potential, several presentations have, since 1995, been made indicating that a large number of alternatives to this fumigant exist or are under development.

For example, in a publication edited by H. J. Banks, (1995), Rodriguez-Kabana and Martinez-Ochoa have reported a case study on cut flower production in Colombia without methyl bromide. In their publication, Rodriguez-Kabana and Ochoa have shown that Colombian floricultural soils are generally acidic and very high in organic matter content leading to longer retention of methyl bromide after application than in other soils. Retention of methyl bromide in soils results in delayed planting and may cause phytotoxicity. Therefore these factors, which impede use of methyl bromide, provided incentive to Columbian farmers to shift to other alternative technologies.

Alternatives to methyl bromide in Colombia have been listed by Rodriguez-Kabana and Martinez-Ochoa and include composting materials like plant residues mixed with cow manure, steam sterilization, Integrated pest Management, with particular emphasis to strict sanitary conditions together with design of greenhouses, strict monitoring of soil nutrients and moisture, and continuous checking of weather variables to avoid disease situation, and breeding of resistant varieties. Although some of the Colombian flower growers who still use methyl bromide in soil with low organic content.

In Africa, the work of Cassidy (1995) on growing of strawberries and beans without methyl bromide provides another case study. In this case study, incidence of soil-borne diseases such as *Verticillium albo atrum* and *Phytophthora cactorum* attacking strawberries; Pythium spp. Rhizoctonia spp and Fusarium oxysporum attacking beans were controlled without use of methyl bromide by implementing the following Integrated Pest Management Strategy:

* addition of organic matter and other suitable soil amendments such as oxyhumates
* introduction of selected beneficial organisms, in particular Trichoderma spp
* selection of agro-chemicals specific to the target species
* planting of suitable break crops

Cassidy however points out that the level of control achieved were "*anecdotal but nevertheless have been quite clear*" The conclusion to be drawn from this study case is that the level of control achieved by IPM was not satisfactory, and that IPM practices only compliments other control strategies.

Okioga (1994) reported that a preliminary trial in Kenya indicated that extracts of *Tagetes minuta* effectively reduced the number of *Meloidogyne* - infested rose plants in a commercial field. Although an increasing number of commercial farms in Kenya are currently conducting trials with this natural plant extract (Ohayo-Mitoko, 1995), it is most likely that the *Tagetes minuta* extract per se would not provide a desirable level of pest control for a high value cash crop like roses. Other pest control strategies will have to be included in order to enhance the pest control to the required level.

Comments on various Viewpoints regarding the availability and use of alternatives to methyl bromide for soil fumigation in Africa.

Currently Listed Alternatives

A long list of available alternatives to methyl bromide for soil fumigation should be interpreted with caution. The list of most alternatives mentioned in various publications merely indicates the potential and not existing alternatives. For the potential alternatives to be of any commercial value, there is a critical need to carry out demonstration projects, on a priority basis, to evaluate their efficacy in the African region. Without these demonstration projects to verify the relevance of these alternatives to the special needs of representative countries in Africa, then the list is of theoretical nature rather than practical value.

Case Studies

The case studies, such as the ones reported by Rodriguez-Kabana and Martinez-Ochoa (1995) in Colombia, Miller and Wilkinson (1995) in Zimbabwe, Schonfield et al (1995) in Africa, Cassidy (1995) in South Africa and Okioga (1995) in Kenya, indicate possible alternatives which are likely to be used to complement other control measures to replace methyl bromide. These case studies should be re-evaluated under varying conditions found in the African region to confirm their efficacy. The results should be reproducible, under different climatic conditions, soils and cropping pattern, to confirm their effectiveness prior to their adoption as alternatives.

Criteria for an Alternative

An alternative should meet the following criteria:

* meet regulatory requirements of the country
* be efficacious
* be cost-effective
* be available before methyl bromide phase out
* be commercially viable
* be environmentally sound
* be socially and economically acceptable to the country

Disruption to agricultural production

In view of the fragile economics of Africa, the phase out of methyl bromide must be smooth and orderly. Hasty phase out prior to putting in place a viable will impact negatively on the Agriculture of the continent which currently has not enough food to feed her increasing population. Therefore, overt or covert schemes by any of several Parties to the Montreal Protocol to influence a hasty phase out of methyl bromide in Africa without a viable replacement will be doing a disservice to the continent already faced with insufficient food and over-burden with external debts, poverty, illiteracy and the vagaries of natural disasters such as drought.

Technology Transfer

Due to lack of technical know-how in handling of new alternative technologies such as soil solarization, use of soilless substrates, the technology transfer should form an important components during the demonstration projects. Furthermore, alternatives which require additional facilities, personnel training will be addressed to appropriately to enable effective implementation of putting in place the alternatives to replace methyl bromide.

Financing of the demonstration projects

For countries operating under Article 5, methyl bromide was controlled in 1995 during the 7th Meeting of the Parties to the Montreal Protocol. Consequently, the Multilateral Fund should now be able to provide reasonable funds for demonstration projects. Lack of funding may lead to deference of the freeze date in Article 5 countries already provided for in the control schedule of methyl bromide.

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