ENABLING FARMERS TO ADOPT METHYL BROMIDE ALTERNATIVES: STRATEGIES AND SUCCESSES OF TECHNOLOGY TRANSFER TO INDIVIDUAL FARMERS - THE JORDANIAN EXPERIENCE.

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Farmers, worldwide, are conservative. Once farmers adopt a technology they find suitable to their subjective needs, it is usually very difficult to introduce changes. Exceptions are technologies that the farmers perceive as cheaper, simpler or easier to implement, or less labor intensive. Health aspects concerning the farmers themselves, their laborers, or the community, as well as environmental issues rank very low in farmers' priorities.

Any successful technology transfer requires the design – from literature, or other external sources – of approaches adapted to local conditions. Besides the technical and ecological feasibility, this must include a thorough economic assessment. In Jordan, the GTZ-team of the IPM Project "Promotion of Sustainable Plant Protection Systems" has developed an approach specifically designed for adapting and disseminating innovative technologies to largely individualistic farmers.

After the identification of promising technologies, they are proposed to several well-educated "pioneer-farmers" for trial on small parts of their farms in a participatory approach with the project providing technical assistance. This is the real technology adaptation phase. When these farmers later decide to expand the new methods to larger parts of their farms, the technology adaptation process has been successful.

However, the real challenge is to bring these adapted methods to the farming population, as a whole. Farmers in Jordan react badly to the top-down approach. The fact that "pioneer-farmers" are often looked upon as examples by less successful farmers helps. Field days have to be organized systematically to bring as many farmers as possible in contact with these "pioneer-farmers". Experienced technical personnel then have to carefully coach the new farmers into discovering the workings of the new technology on their own land. This avoids costly mistakes due to lack of understanding.

This process can be aided, but not replaced by the distribution of extension materials, and the broadcasting of technical messages on TV and radio. Such activities will stimulate interest.

Farmers are sensitive to economic changes. In 1997 methyl bromide prices reached a high of US$ 446 per 1000 m^2 at the recommended rate of 50 g/m^2. At that time, many farmers spontaneously converted to solarization, an alternative they had heard about previously. Since they were not sure of the new technology, many reverted back to methyl bromide after prices dropped.

Nevertheless, total methyl bromide consumption decreased from 285 tons in 1996 to 150 tons in 1997.

Through policy measures, e.g. levying sales or environmental taxes on methyl bromide, such a situation could be created. This, however, should only be considered after the process to enable farmers to use alternatives has reached an advanced stage. If farmers are forced to abandon their practices without a new technology, much economic damage may be inflicted.

Concerning technology development there is mounting evidence suggesting that the effect of solarization may not only be based on heat sterilisation. Rather, it appears that there is a change in the composition of soil micro-organisms in favour of beneficial ones at modestly increased soil temperature and moisture. In the absence of host plants, soil borne plant pests and pathogens are at a disadvantage compared to soil organisms that prey on them. To augment these changes, the beneficial fungus Trichoderma harzianum is integrated into the technology. In this way, solarization may even be suitable for cooler climates outside the Jordan Valley.

Regarding cost comparison, the methyl bromide alternative soil solarization plus Trichoderma arouses farmers' interest in Jordan, even at average prices.

Cost of methyl bromide application:
Average US$ 292 per 1000 m^2. (Minimum: US$ 140 per 1000 m^2.)

Cost of soil solarization including Trichoderma application:
Average US$ 140 per 1000 m^2. (Maximum: US$ 154 per 1000 m^2.)

In spite of these figures, some farmers are still reluctant to apply solarization, because it is more labour intensive during the hottest part of the year.

In 1997, some farmers tried strip solarization with ordinary black mulch in combination with Trichoderma. They were satisfied and did not report any differences between strip-solarized crops and soil fumigation with methyl bromide. Input as well as labour cost was further considerably reduced:

Cost of black mulch strip solarization, including Trichoderma application:
Average US$ 40 per 1000 m^2. (Maximum: US$ 56 per 1000 m^2.)

As shown above, the economics of methyl bromide alternatives are currently very favourable in Jordan. In combination with the technology transfer approach developed by the GTZ-team, an early start to methyl bromide phase-out appears feasible, and should be attempted.

IPM: Integrated Pest Management
GTZ: Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH (German Technical Cooperation)

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