Project to phase-out methyl bromide in the dried fig sector in Turkey

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Project partners:
- TARIS: Union of Farmers Cooperative (Implementing agency), 5000 members and a major dried fig processor
- Ege University Faculty of Agriculture Dept. Of Horticulture (Quality analysis)
- Ankara University Faculty of Agriculture Dept. Of Plant Protection (Control of storage pests)

*In collaboration with the Aegean Exporters’ Union (end-user) and the Ministry of Agriculture and Rural affairs*
Turkey is the leading country in production and trade of dried fig fruits with a share of 65 to 70%.

Nearly 30,000 farmers involved in Aegean (Ege) region.

The Aegean Region produces all of the dried figs destined for exportation (90% exported). It is also the main raisin producing region.
FIG PRODUCTION IN TURKEY

- Storage pests (*Ephestia cautella* & *Carpoglyphus lactis*) create significant problems if not controlled.
- Methyl Bromide is the fumigant (cheap & effective) used by the sector to control pests.
- About 10% of the production is certified as organic where deep freezing (high energy demand and high cost) is the unique tool.
Project objectives: to recommend to the dried fig sector technical and economic feasibility of MBr alternatives that

- provide 100% mortality of all stages of major fig pests,
- have short exposure time,
- easy handling
- short operation time,
- low capital and operational cost,
- result in high quality end-products
- be environmentally safe.
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- Methyl bromide alternatives:
  - CO₂
    - High pressure
    - Atmospheric pressure
  - Phosphine (Mg PH₃)

- Introduction of new tools
  - Pressure tanks
  - Volcani cubes
Recommendations: Alternatives varying in cost and time efficiency

- **Cost efficient** (Phosphine, atmospheric Carbon dioxide applications) alternative applications need longer durations
- Carbon dioxide application under high pressure: **Time efficient** however investment & operation costs are high
- Carbon dioxide applications are accepted according to national and international regulations on organic agriculture.
## Economic analysis of alternatives

<table>
<thead>
<tr>
<th></th>
<th>Recommended Conditions &amp; Dose (g/Ton)</th>
<th>Cost $/ton</th>
<th>Ratio to MBr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon dioxide (High pressure)</td>
<td>20 bars</td>
<td>23.4-26.0</td>
<td>10</td>
</tr>
<tr>
<td>Carbon dioxide (Atmospheric pressure)</td>
<td></td>
<td>2.3-2.6</td>
<td>1</td>
</tr>
<tr>
<td>Phosphine (FUMICEL)</td>
<td>1</td>
<td>0.157</td>
<td>1/16</td>
</tr>
<tr>
<td></td>
<td>1.5</td>
<td>0.235</td>
<td>1/12</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0.315</td>
<td>1/8</td>
</tr>
<tr>
<td>Methyl Bromide</td>
<td>60 g/m3</td>
<td>2.3-2.6</td>
<td>1</td>
</tr>
</tbody>
</table>
- Three stage-seminars to disseminate the results
  - General information on MBr Phase-out
  - Transfer of experience from different countries (California/US, Spain, France, Israel) to firm owners or decision makers
  - Technical aspects of the application of proposed alternatives (Technical staff)
Accompanying measures:

- Web-site 
  www.mbralternatif.com,  
  www.mbralternative.com
- Information regarding legislation 
- Results obtained from the project (information file & CDs) 
- Posters
In all seminars, representative of the Ministry of Agriculture and Rural Affairs was invited to address the sector representatives directly and update the information on Turkey’s MBr phase-out programme.

This opportunity provided face to face discussions between the sector that will face the phase-out and the national authority. Further meetings were held between the two parties.

Project partners attended meetings of the other MBr Phase-out projects carried out in Turkey.
Information on safety given in last seminar and in posters

- Gas detection equipment (Draeger ve Auer Tubes)
- Electrochemical sensors
  (Draeger MiniWarn, ATI PortaSens II, Lumidor Micro Max, Draeger PacIII, MSA Detectors, Bedfont monitor)
Impact of training activities: Survey of MBr alternative techniques in dried fig sector

- Companies informed about MBr phase-out program: 100%
- Acceptance of Phosphine as a potential alternative: 100%
- Acceptance Carbondioxide as an alternative: 53% (This ratio is 100% among organic companies that currently use deep-freezing)
- Current demand received from abroad for MBr alternative treated figs: 33%
- Another survey is planned for April 2005 to evaluate the latest acceptance
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- Results can be repeated in related sub-sectors important in Turkey or other countries as other dried fruits, nuts, medicinal and aromatic plants.
- Other MBr alternatives may appear in the future especially those that require short exposure periods may have chances. Last week a meeting was held to discuss sulfuryl fluoride.
● Project results were presented at international meetings (Canada, Australia, USA, Portugal...) to share the findings with other countries.

● Other aspects to give the sector a complete recipe were also tested:
  - Time and manpower required for loading and unloading determined
  - Positive effects of MBr eg. microbial growth were also tested for alternatives.
  - The period required for release of CO2 applied under high pressure