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EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Twenty-fifth Meeting
Montreal, 29-31 July 1998

PROJECT PROPOSAL: URUGUAY

This document includes the comments of the Fund Secretariat on the following project proposal:

Fumigant

- Demonstration project: alternatives to the use of methyl bromide as a soil fumigant in protected horticultural crops (cucumbers and peppers), seedbeds, and nurseries (vegetables, tobacco and forestry)

UNIDO

PROJECT EVALUATION SHEET **URUGUAY**

SECTOR: FUMIGANT ODS use in sector (1997): 27 ODP tonnes

Sub-sector cost-effectiveness thresholds: N/A

Project Title:

Demonstration project: Alternatives to methyl bromide as a soil fumigant in protected horticultural crops, seedbeds and nurseries

Project Data	Methyl Bromide
	Instituto Nacional de Investigación Agropecuaria - INIA
ODS phase-out (ODP tonnes)	-
Proposed project duration (months)	24
Total incremental costs (US \$)	403,700
- including contingency (%)	10
Total project cost (US \$)	403,700
Local ownership (%)	100
Export component (%)	-
Amount requested (US \$) {Original}	426,800
{Revised}	403,700
Cost effectiveness (US \$/kg)	-
National Coordinating Agency	Unidad del Ozono. Dirección Nacional de Medio Ambiente. Ministerio de Vivienda, Ordenamiento Territorial y Medio Ambiente
Implementing Agency	UNIDO
Technical review completed?	n/a

<i>Secretariat's Recommendations:</i>	
Amount recommended (US \$)	Pending decision of the Executive Committee
Project impact (ODP tonnes)	
Cost effectiveness (US \$/kg)	
Implementing Agency support cost (US \$)	
Total cost to Multilateral Fund (US \$)	

PROJECT DESCRIPTION

Demonstration project: Alternatives to methyl bromide as a soil fumigant in protected horticultural crops, seedbeds and nurseries

1. Over the last seven years consumption of methyl bromide has increased from four tonnes to 27 tonnes. Methyl bromide consumption data reported to the Ozone Secretariat in 1996 was 2.7 tonnes. More than 90% of methyl bromide use in the provinces of Artigas and Salto in the warmer region of the country. Over the last years, intensive cultivation of crops, such as tomatoes, cucumbers and peppers, in the same soil under plastic shelters has led to several phytosanitary problems (*Meloidogyne incognita*, *Fusarium* wilts and *Rhizoctonia solani*). Presently, soil-borne pest control is achieved using methyl bromide.
2. The Government of Uruguay contacted UNIDO in order to develop demonstration projects for alternatives to methyl bromide. In April 1998, the framework for establishing a two-year demonstration project to evaluate alternative technologies to methyl bromide as a soil fumigant was discussed by UNIDO and the "Comisión Técnica Gubernamental del Ozono" (Ozone Unit), the "Director Nacional de Medio Ambiente, Ministerio de Vivienda, Ordenamiento Territorial y Medio Ambiente", the "Instituto Nacional de Investigaciones Agropecuarias", the "Programa de Reconversión y Desarrollo de la Granja", the "Dirección de Servicios de Protección Agrícolas, Ministerio de Ganadería, Agricultura y Pesca".
3. This project is to demonstrate the effectiveness of six alternative techniques to the use of methyl bromide as a soil fumigant in protected horticulture, seedbeds and nurseries. The selected alternatives are: i) soil solarization; ii) bio-fumigation; iii) low doses of pesticides; iv) cultural practices, such as crop rotation, following, fast crops, trap crops, planting time, fertilization, and sanitation; v) use of resistant varieties and grafting; and vi) steam pasteurization and the use of non-soil substrates. All these techniques will be used as part of an Integrated Pest Management (IPM) system.
4. An Integrated Pest Management (IPM) programme for crop protection utilizes a combination of cultural practices, including crop rotation, cover crops, fertilization and plant nutrition; physical methods, including steam, solarization, and heat, and use of chemical compounds. A combination of soil pasteurization and IPM has proven to be an effective approach for the control of pests and diseases in horticulture (annual losses of only 1-2% due to bacterial and fungal diseases, as compared to much higher losses when relying on soil fumigation with methyl bromide only). Also, an IPM programme could improve the effectiveness of mixtures of pesticides, nematodes, herbicides and fungicides applied (the pesticide mix has to be prepared according to the ecology and climate of the area). Soil

solarization is most effective when implemented as a component of an IPM system (used in combination with other chemical and non-chemical pest control methods such as soil amendments, bio-fumigation, reduced rates of soil fumigants). The use of plant resistant varieties needs to be integrated into an IPM programme to overcome emergence of new types of pests and severe environmental conditions (e.g., high temperature, salinity).

5. During the first year, the selected alternative techniques to methyl bromide will be tested in tomato, cucumber, and pepper crops in small-scale experiments on farmers' lands. Steam pasteurization and non-soil substrates will be tested at the experimental stations of the "Instituto Nacional de Investigación Agropecuaria". In the second year, the most promising alternatives will be tested on a full commercial scale in at least four leading companies and growers in the North South regions. Steam pasteurization and non-soil substrates will be tested in commercial seedbeds and nurseries.
6. The expected results from project implementation are: (i) a technical and economic analysis of utilization of proposed alternatives to methyl bromide, (ii) one agronomist and two IPM specialists fully trained in the alternative technologies used; and (iii) dissemination of the results of the demonstration project within the Northern and Southern regions of Uruguay.
7. The project will be co-ordinated by the Ozone Unit of the "Dirección Nacional de Medio Ambiente of the Ministerio de Vivienda, Ordenamiento Territorial y Medio Ambiente" in close co-operation with the "Instituto Nacional de Investigación Agropecuaria", the "Dirección de Servicios Agrícolas and the Programa de Desarrollo y Reconversión de la Granja, Ministerio de Ganadería Agricultura y Pesca".
8. One agronomist and two local IPM specialists will be recruited for managing and supervising the demonstration projects, including designing the tests, collecting and analyzing the data, supervising field activities and coordinating the services of project personnel. The total cost for human resources is US \$275,000 including a subcontract for field work (US \$155,000), and the cost of the equipment is US \$69,000. In addition, US \$55,000 have been requested for laboratory analyses (usually included in the subcontract with an institution responsible for demonstration trials) since the potential subcontractor (INIA) has no human resources or technical conditions to carry out plant pathology tests. A cost breakdown is attached to the project evaluation sheet.

SECRETARIAT'S COMMENTS

1. The project concept follows the Executive Committee's guidelines. Uruguay ratified the Copenhagen Amendment on 7 March 1997.
2. UNIDO informed the Secretariat that, during project preparation, special emphasis has been put in working with the institutions, organizations, professionals and agro-industries which are transferring the technology to the farmers.
3. The Secretariat asked if UNIDO had contacted Article 2 countries with a view to recruiting government experts from those countries (as per Decision 24/18). In this regard, UNIDO indicated that "the use of external expertise is needed only when the local institutions require advice in using state of the art techniques of which there is only a theoretical knowledge in Article 5 countries".
4. The Secretariat informed UNIDO that peppers are not in the priority list of crops in the approved strategy, and thus the project needs to be revised. In this regard, UNIDO informed that the Government had requested this crop be included in the project proposal since it is an important crop fumigated with methyl bromide. However, in the design of the demonstration plots, attention had been given to the fact that in none of the project sites, the trials with pepper would be carried out alone. Since pepper had already been included as a "marginal crop" (as part of a multi-crop rotation system), the financial implication in the project budget is not expensive". The project costs were adjusted accordingly.
5. Notwithstanding the emphasis placed by UNIDO on working with local institutions and on seeking to reduce salary costs, the concept and cost structure of this project is similar to projects initially approved by the Executive Committee. Taking this into consideration, the Executive Committee may consider whether it wishes to approve the project with associated support costs at the funding level shown in the table below:

Project Title	Project Cost US \$	Support Cost US \$	Implementing Agency
Demonstration project: Alternatives to methyl bromide as a soil fumigant in protected horticultural crops, seedbeds and nurseries	403,700	52,481	UNIDO

ANNEX I.

PROJECT BUDGET

BUDGET LINE	DESCRIPTION	W/M	US \$
11-01	International Expert IPM Specialist	4.0	60,000
11-02	International Expert in Bio-fumigation	2.0	30,000
11-03	International Expert in Grafting	1.0	15,000
11-04	International Expert in Soil Steam Pasteurization and Non-soil Substrates	1.0	15,000
21-00	Subcontract for Local Trials as per Annex III.		195,000
32-00	Study Tour (<i>4 participants</i>)		18,000
35-01	National Workshop		16,000
41-00	Consumables as specified in Annex II.		14,000
51-00	Publication Costs		4,000
SUBTOTAL			367,000
71-00	Contingencies (<i>10%</i>)		36,700
99-99	TOTAL PROJECT COST		403,700
	Overhead Costs (<i>13%</i>)		52,481
TOTAL PROJECT BUDGET			456,181

ANNEX II.

PRELIMINARY EQUIPMENT SPECIFICATIONS AND COST BREAKDOWN

Preliminary equipment specifications and breakdown of costs are as follows:

BUDGET LINE	DESCRIPTION	TOTAL COST (in US Dollars)
41-00	Expendables like seeds, pesticides, dripping irrigation, artificial substrates, seedlings, selective wavelength plastic sheets, basins, trays, etc.	14,000
TOTAL		14,000

NOTE: A steam generator for pasteurization of soils and substrates in agriculture is available at INIA. This equipment can be used for the present project and may be considered as a contribution from the recipient country.

ANNEX III.

PRELIMINARY TERMS OF REFERENCE FOR THE SUBCONTRACT

The subcontractor is expected to:

1. Provide the service of:
 - **one** Agronomist (*total of 24.0 w/m*)
 - **two** IPM Specialists (*Northern and Southern Regions - total of 48.0 w/m*)
 - **one** Agro-economist (*total of 4.0 w/m*)(*Job Descriptions [17-01; 17-02; 17-03; and 17-04] attached herewith under Annex IV.*)
2. Provide transportation for the international experts, one agronomist, the two IPM specialists and one agro-economist to the demonstration sites during the entire duration of the project.
3. Provide transportation to the project sites and installation of the supplies purchased.
4. Make available the necessary area for the experiments as described in the Project Description.
5. Provide the necessary preparatory work at each of the sites selected for the demonstration tests and trials: soil preparation, planting and implementation of alternative pest control technologies.
6. Provide service of all the necessary manual workers to implement the above and for the regular maintenance of the plots.
7. In the first year, organize and perform the demonstration tests and trials on a small scale (**60 m²**) for tomatoes, cucumbers and peppers, using all the proposed technologies and in accordance to the timetable and methodology given by the international experts in close co-operation with the local agronomist, as per **Annex III.1.**
8. During the second year, organize and perform the demonstration trials of the most promising alternative technologies on a full commercial scale (**1,000-1,500 m²**) in the greenhouses made available by the most important producers of horticultural products (*tomatoes, cucumber and peppers*) and seedbeds and nurseries.
9. Compensate the farmers for the use of their own greenhouses and for the inputs provided.
10. Provide fuel-oil for the steam boiler used in the steam pasteurization tests.
11. Prior to initiating any activity, provide the analytical protocols for monitoring, on a quantitative and qualitative basis, the populations of nematodes, fungi, bacteria and insects.

12. Provide the most suitable protocol to monitor the incidence of weeds.
13. At each project site, perform soil, water and biological analysis as specified in **Annex III.2.**
14. Collect, record, process, analyse and consolidate the field data of each trial in a daily report.
15. Every three months, prepare and submit a progress report, in English, of the activities performed and the results obtained at each project site. The report should include a fact sheet with the results of each of the demonstration tests performed.
16. At the end of the first year, prepare and submit a consolidated report containing a technical and economic analysis of the results obtained.
17. Provide fully-equipped office facilities, with e-mail and fax connection in working condition, and part-time secretarial service, throughout the entire duration of the project.
18. Throughout the entire duration of the project activities, cover communications costs between the institutions involved and UNIDO headquarters in Vienna (*Austria*) and between the Research Institute and the different project sites.
19. At the end of the second year, organise a national workshop to present to the farmers and growers the project activities and the results obtained. This includes providing the venue and all facilities.
20. Prepare a paperback publication containing a description of the results obtained.
21. Prepare and submit a final report at the end of the contract.
22. Provide fuel for greenhouse heating, fumigants, fertilizers and pesticides, biological agents, all equipment and unforeseen material necessary for the implementation of the demonstration trials.