QUESTIONNAIRE

4th
ICID SURVEY
of

WORLDWIDE USAGE OF MICRO & SPRINKLER IRRIGATION

Working Group on On-Farm Irrigation Systems
(WG-ON-FARM)

ICID·CIID
International Commission on Irrigation and Drainage
December 2001

Preamble

The erstwhile Working Group on Micro Irrigation (WG-MICRO) had carried out three worldwide surveys about use of micro irrigation i.e. in 1981-82, 1986-87 and 1990-91. The micro irrigated areas as per the 1991 survey was 1.77 Mha, while it was estimated that more than 3 Mha were micro-irrigated worldwide by the year 2000. The decade - 1990-2000 witnessed a quantum leap in adoption of micro irrigation technology, both in developed and developing countries.

The Working Group on On-Farm Irrigation Systems (WG-ON-FARM) at its 3rd meeting held at Cape Town, South Africa in October 2000, agreed to prepare a Questionnaire for 4th survey on "Worldwide Usage of Micro and Sprinkler Irrigation".

The enclosed Questionnaire is based upon that used in the 3rd survey of micro irrigation. Considering the new developments in micro and sprinkler irrigation technologies, the 4th Questionnaire has been revised and expanded.

All the National Committees/Committee of ICID are requested to fill up the questionnaire by latest information, as accurately as possible. It is proposed to compile and publish the information collected through Questionnaire for benefit of all concerned. Please return the filled-in questionnaire to the Central Office, ICID at the earliest. For any clarification, please do not hesitate to contact the Central Office.

Looking forward to co-operation from all National Committees/Committee of ICID.

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Chairman, WG-ON-FARM
(Hungary)

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Director (I)
Central Office, ICID
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Part 1. **GENERAL**

1.1 Country: _____

1.2 Water Resources of the country in Billion Cubic Meters (BCM)

	Water Resources	Potential	Currently used (2000)
1)	Surface		
2)	Ground		
3)	Any other (specify)		

1.3 Water use for different sectors (for the year _____), BCM/Year

- Agriculture _____
- Industrial _____
- Domestic _____
- Hydro-electric _____
- Other (specify) _____

1.4 Per capita water availability _____ Liter/Capita/Year (Year _____)

1.5 Total area under cultivation _____ Mha (Year _____)

1.6 Total net irrigated area (Mha)

i) From Surface Water Resources: _____ Mha
ii) From Ground Water Resources: _____ Mha
iii) Total : _____ Mha

1.7 Total area under various irrigation methods (both from surface and ground water)

(Year _____)

- Surface (furrows, borders, basin and other) _____ Mha
- Sprinkler (all types) _____ Mha
- Micro irrigation (all types) _____ Mha

1.8 Climate of the country or the region(s) where micro irrigated area is concentrated

- Average annual rainfall _____ mm
- Mean maximum and minimum temperatures
  Maximum _____°C, Minimum _____ °C
- Peak evapo-transpiration rate _____ mm/day (in _____ month)
  Number of crop growing seasons _____ (please specify)

1.9 Area under various types of crops grown in the country

(Year _____)

Type of crop	Irrigated (Mha)	Rainfed (Mha)	Total (Mha)
• Cereals			
i) Paddy			
ii) Others			

• Oils and pulses			
• Cotton			
• Sugarcane/Sugar Beet			
• Fruit trees/vineyard/orchards			
• Vegetables			
• Flowers			
• Others			
Total			

2. **MICRO IRRIGATION**

2.1 Development of micro-irrigated areas in your country

Year	Area (Ha)	Remarks, if any
1980		
1985		
1990		
1995		
2000		

2.2 Types of **Micro irrigation systems (MIS)** used in your country

Type of MIS	Indigenous/Imported
Drip system (surface)	
Subsurface drip	
Line source tubing	
Micro-sprinkler	
Mini-sprinkler	
Bubbler	
Bucket/Drum kit	
Other specify	

2.3 Area and crops grown under plastic/green houses and irrigated by micro-irrigation.

2.3.1 Area irrigated by MIS

(Year _____)

- Total area under green/plastic houses _____ Hectares
- Area irrigated by micro irrigation in plastic houses _____ Hectares

2.3.2 Types of crops grown and area under green/plastic houses

Crop	Area under/green plastic houses (Ha.)
Total area (Ha.)	

2.4 Types of crops grown under micro irrigation systems. (please give list of all those crops irrigated by MIS)

Crop	Area under MIS (Ha)	Type of MIS adopted (as per 2.2)
	Total	

2.5 Has micro irrigation been extended to any new crops in the last five years? If so for which crops and why?

2.6 Please provide authentic data on water savings and yield increase for most common micro-irrigated crops compared to surface irrigation/sprinkler irrigation (please specify)

Crop	% saving in water	% increase in yields

2.7 Please provide information on increase in yield of plastic/green house crops irrigated by MIS

Crop	Yield with plastic house (ton/Ha)	Yield w/o plastic/green house (tons/Ha)

2.8 Please provide information on Net Irrigation Requirement (NIR) of some typical micro-irrigated crops grown in your country/region.

Crop type	Name	NIR (MM)
Field crops		

Vegetables		
Fruit trees/vines		
Flowers		
Others (specify)		

2.9 What are the largest and average farm sizes of micro-irrigated crops in your country?

- Largest farm size (range) _____ Ha
- Average farm size (range) _____ Ha

2.10 Planning, design and installation of MIS

2.10.1 What design manuals or computer models are used to design MIS in your country?
Provide list of such manuals/computer models/softwares

2.10.2 Who design MIS for farmers?

- Government Agency
  (Extension Agency/ Irrigation Advisory Services/University) ☐

- Representatives/authorized dealers of manufacturers ☐
- Private consultants ☐
- Any other (please specify) ☐

2.10.3 What manuals or technical guides are used in the installation of MIS in your country?
Please provide list of such Manual/Guidelines.

2.10.4 Who install MIS on farmers' fields?

- Representatives/Engineers/Technicians of the concerned Manufacturers/Industrial firms ☐
- Consulting firms/engineers ☐
- Farmers themselves ☐

2.10.5 What is the mechanism of supply/purchase of MIS equipments/material for installation on fields?

- Through dealers (distributors appointed by manufacturers) ☐
- Through Govt. Agency ☐
- Through local market ☐

2.11 Fertigation and chemigation practices followed in your country.

2.11.1 Is application of fertilizer through MIS practiced in your country?

Yes ☐ No ☐

2.11.2 If yes, area under fertigation _____ Ha,

i) Proportion of area on which liquid fertilizers are used ____% (approximately)
ii) Proportion of area on which soluble solid fertilizers are used ____% (approximately)

2.11.3 List names of commonly used liquid fertilizers in your country

2.11.4 Method of fertigation practiced

- Venturi type ☐
- Closed tank type ☐
- Piston pump type ☐
- Any other type (please specify) ☐

2.11.5 To what extent other chemicals viz. insecticides, herbicides and fungicides are applied through MIS for improved crop production?

- Proportion of insecticides ____% of micro irrigated area (approximately)
- Proportion of herbicides ____% of micro irrigated area (approximately)

2.11.6 To what extent chemicals like sulfuric acid, chlorine or other bactericides are applied through MIS for routine maintenance? (For example, sulfuric acid 20% of the total chemicals used)

2.12 Use of saline water in MIS

2.12.1 Is saline water used for MIS in your country? Yes ☐ No ☐

If yes, please state the approximate area of MIS under such waters

Salinity	Area (Ha)
1. Saline water (EC: 0.7 to 42 ds/m, and TDS 500-3000 mg/litre)	
2. Slightly Saline water (EC: 0.7 to 3.0 ds/m, and TDS 500-2000 mg/liter)	
3. Medium saline (EC: 3.0-6.0 ds/m, and TDS 2000-4000 mg/liters)	
4. Highly saline (EC >6.0 ds/m, & TDS > 4000 mg/liter)	
5. Very saline (EC >14 ds/mg, TDS > 9000 mg/liter)	
Brine water (EC>42 ds/m and TDS >30000 mg/liter)	

2.12.2 What preventive measures/treatments are followed while using saline waters for micro irrigation in your country?

2.12.3 Is any research being conducted into use of saline waters for micro irrigation?

Yes ☐ No ☐

If yes, please provide list of some important National/International level Research Institute(s) and provide copies of any published papers on this topic.

2.12.4 Whether water quality testing is carried out prior to design/installation of MIS in your country.

Yes ☐ No ☐

If yes, please briefly state experience in this regard and attach one filled-in sample proforma of water quality analysis data sheet.

2.13 Cost of Micro irrigation systems

2.13.1 Whether subsidy is made available for purchase of MIS equipments?

Yes ☐ No ☐

If yes, who gives the subsidy and how much?

- Federal/Central Government ☐
- State Government ☐
- Manufacturers/Distributors ☐
- Farmers co-operatives ☐
- Voluntary organization ☐

Please provide details of subsidy structure adopted for MIS in your country (If necessary attach additional papers)

2.13.2 What is the typical or average range of annual operating costs of MIS for the year 2000/2001 in your country?

Please give appropriate estimates for major crops in your country.

Type of MIS	Crop(s) irrigated	Annual maintenance, repair and replacement cost (US$/Ha)	Annual Energy Cost of Pumping (US$/Ha)

2.13.3 Please provide information on typical or average range of initial capital cost for MIS for the year 2000/2001, in your country.

Type of crops	Spacing RxP (MxM)	Type of MIS	Cost US$/ha	Indigenous/ Imported System
Trees/Orchards				
Grapevine				
Vegetables				
Flowers				

Field crops				
Cotton				
Sugarcane				
Others specify				
Plastic/Green Houses*				

R = Row to Row spacing
P = Plant to plant spacing

(Please do not include the cost of water source creation, pumpsets for lifting and conveying water upto field and pipes for conveyance of water upto fields in the initial investment cost of MIS. But include the cost of pumpset, main, submain pipes, control head and other accessories as an integral part of MIS. **Also clarify whether the costs are actual or subsidized one**).

**In case of plastic/green houses, please indicate clearly the cost of plastic/green house and MIS separately.*

2.13.4 How irrigation water is priced in your country?

Volumetric basis		Area basis	
Area and crop basis		Any other (pl. specify)	

What is the cost of canal/surface irrigation water for the farmers, in your country?
US$ _____ /100m³
US$ _____ /hectare
(Attach additional papers, if necessary)

2.14 Life of MIS

What is the average design and actual life of the MIS components and system in your country?

Component	Design life (Years)	Actual life (Years)
1. Control Head		
2. Main/Sub-main pipes		
3. Laterals		
4. Emitters		

2.15 Standards and Testing Facilities for MIS

2.15.1 Whether ISO Standards pertaining to irrigation equipments (ISO/TC23/SC18) are followed/adopted in your country?

Yes ☐ No ☐

If yes, give list of those standards which are adopted/followed in your country. (Attach additional sheet, if necessary)

If no, give reasons for not adopting them.

2.15.2 Whether your country has the Standard Institution and has developed/developing your own national standards for Micro irrigation equipments?

Yes ☐ No ☐

If yes, give the name of the Standards Institution, year of its establishment and list of standards developed pertaining to micro-irrigation system/equipments.

2.15.3 Whether there is any testing facility for evaluating performance of micro irrigation system components (e.g. Emitters, filters, laterals etc.) in your country?

Yes ☐ No ☐

If yes, please provide the name and contact addresses of Institutions having testing facilities along with their year of establishments. Please also enclose details of the test facility and relevant Reports/publications of the Institute.

2.16 Performance of Micro irrigation systems

2.16.1 Whether performance evaluation of MIS installed on fields is carried out in your country?

Yes ☐ No ☐

If yes,
What performance parameters are evaluated in the field?

- Field application efficiency (Ea) ☐
- Field emission uniformity (EU) ☐
- Emitter discharges (q) ☐

2.16.2 What are the typical or average range of field application efficiencies (Ea) and emission uniformity (Eu) observed in your country.

MIS Type	Type of crop	Ea %	DU %	Source of information
1. Online drip system				
2. Inline surface drip system				
3. Sub surface drip system				
4. Micro-sprinkler				
5. Mini sprinkler				
6. Bubbler system				
7. Bucket kit				
8. Green/plastic house systems				

2.17 Training, education and capacity building in MIS

2.17.1 Whether there is an adequate coverage about MIS at graduate/post graduate level in your country.

Yes ☐ No ☐

If yes, provide list of some important Institutions imparting education about MIS.

2.17.2 Is there any specialized institutions for capacity building in various aspects of MIS?

Yes ☐ No ☐

If yes, give details of the Institutions.

2.17.3 Whether Irrigation/Agricultural professionals receive any training in planning, design, installation and evaluation of MIS?

Yes ☐ No ☐

If yes, give contents of training courses in brief (please attach separate sheet).

2.17.4 Whether there is facility for training farmers in adoption, operation & maintenance of MIS?

Yes ☐ No ☐

If yes, who imparts training and whether training facility is adequate?

2.17.5 Has your country held a major Conference/Workshop/Congress/Seminar/Round Table on micro irrigation in the last 10 years?

Yes ☐ No ☐

If yes, provide list of the events and if possible send a copy of the proceedings or report.

2.18 Status of manufacture of MIS components.

2.18.1 Is MIS components are manufactured in your country?

Yes ☐ No ☐

If yes, please provide data on number of manufacturing firms.

	Numbers
Large scale	
Medium scale	
Small scale	

2.18.2 Whether MIS components/units are imported in your country?

Yes ☐ No ☐

If yes, how much is the annual approximate turnover (US$)

2.18.3 Whether MIS components are exported to other countries?

Yes ☐ No ☐

If yes, how much is the annual approximate turnover (US$) and to which countries exported.

2.19 Please provide feedback on the problems faced and lessons learnt in adoption of MIS in your country, in respect of (Attach separate sheet)

- Planning, design and installation
- Availability of suitable pumpsets and system components
- Investment cost of the system
- Providing subsidy to the farmers
- Quality of various components
- Testing of equipments
- Water availability and quality
- Energy supply to MIS
- Operation and maintenance

- Scheduling of micro-irrigation
- Fertigation
- Chemigation
- Automation of MIS
- After sale services by manufacturers
- Damage from rodents, squirrels, insects etc.
- Extension advisory services for farmers, especially for MIS
- Training of professionals, technicians and farmers

3. SPRINKLER IRRIGATION

3.1 Development of Sprinkler irrigated areas in your country.

Year	Area (Mha)	Remarks, if any
1970		
1975		
1980		
1985		
1990		
1995		
2000		

3.2 Types of **Sprinkler irrigation systems (SIS)** used and corresponding areas in your country.

	Type of SIS	Area (Ha)	Indigenous/ Imported
1.	Hand move fully portable system		
2.	Hose move semi-permanent/portable system		
3.	Manually moved Gun sprinklers		
4.	Mechanically moved sprinkler systems		
4.1	Side roll laterals		
4.2	Side move laterals		
4.3	End tow laterals		
4.4	Boom sprinklers		
4.5	Travelling sprinkler hose reel system		
4.6	Travelling sprinkler cable winch system		
4.7	Center pivot		
4.8	Linear move		
4.9	LEPA		
4.10	Solid set system		
4.11	Perforated pipe/spray line		
		Total =	

3.3 Type of crops grown under SIS

Type of Crop	Area under SIS (Ha)	Types of SIS used (refer item 3.2)
	Total	

3.4 Has sprinkler irrigation been curtailed for some crops or extended to any new crops in the last five years? Please provide details.

3.5 Please provide data on water savings and yield increase for most common sprinkler irrigated crops, compared to surface irrigation.

Crop	% saving in water	% increase in yields

3.6 What are the largest and average farm sizes of sprinkler irrigated crops in your country?

- Largest farm size (range) _____ Ha
- Average farm size (range) _____ Ha

3.7 What planning & design manuals or computer softwares are used to design SIS in your country?

Provide list of such manuals/computer softwares.

3.8 Who design and install SIS on farmers fields?

3.9 What is the mechanism of purchase/supply of SIS equipments for installation on fields.

3.10 Whether fertilizers are applied through sprinklers?

Yes ☐ No ☐

3.10.1 If yes, area covered under fertigation through SIS ____ Ha, _____% of total area under SIS

3.10.2 Give list of solid and liquid fertilizers used through SIS

3.10.3 Briefly state mechanism of fertigation through sprinklers.

3.10.4 Whether any other chemicals are applied through sprinkler system in your country?

Yes ☐ No ☐

If yes, please specify

3.11 Use of poor quality water through SIS

3.11.1 Is saline water is used through sprinklers?

Yes ☐ No ☐

If yes, what is the salinity level of water (EC = ?, TDS = ?), crops irrigated, and extent of irrigated area

3.11.2 Is sewage water is applied through sprinkler irrigation?

Yes ☐ No ☐

If yes, provide details – crops and area irrigated, treated/untreated sewage etc.

3.12 Cost of sprinkler irrigation systems

3.12.1 Please provide information on typical or average range of initial investment cost for SIS for the year 2000, in you country.

	Type of SIS	**Average cost (US$/Ha)**	**Indigenous/ Imported**	**Area irrigated/day (in ____ hours) (Ha)**
1.	Hand move fully portable system			
2.	Hose move semi-permanent/portable system			
3.	Manually moved Gun sprinklers			
4.	Mechanically moved sprinkler systems			
4.1	Side roll laterals			
4.2	Side move laterals			
4.3	End tow laterals			
4.4	Boom sprinklers			
4.5	Travelling sprinkler hose reel system			
4.6	Travelling sprinkler cable winch system			
4.7	Center pivot system			
4.8	Linear move			
4.9	LEPA			
4.10	Solid set system			
4.11	Perforated pipe/spray line			
		Total =		

(Please do not include the cost of water source creation, pumpset for lifting and conveying water upto farm and pipes used for conveyance of water upto the farms in the initial investment cost of SIS. But include, the cost of pumpset used for creating required pressure, main, sub main lines, valves, etc.). **Also clarify whether the costs are actual or subsidized one.**

3.12.2 What is the typical or average range of annual operating costs of SIS?

(Year _____)

Type of SIS	**Annual energy cost of pumping (US$/Ha)**	**Annual maintenance, repair cost (US$/Ha)**

3.12.3 Whether subsidy is made available to farmers for purchase of SIS equipments?

Yes ☐ No ☐

If yes, who gives the subsidy and how much?

- Federal/Central Government ☐
- State Government ☐
- Manufacturers/Distributors ☐
- Farmers co-operatives ☐
- Voluntary organization ☐

Please provide details of subsidy structure adopted for SIS in your country (If necessary attach additional papers)

3.13 Life of SIS

What is the average design and actual life of the SIS components in your country?

Component	Design life (Years)	Actual life (Years)	Type of material used
1. Pumpset			
2. Main/Sub-main pipes			
3. Laterals			
4. Sprinklers			

3.14 Standards and Testing Facilities for SIS.

3.14.1 Whether ISO/CEN Standards pertaining to irrigation equipments (ISO/TC23/SC18) are followed/adopted in your country?

Yes ☐ No ☐

If yes, give list of those standards which are adopted/followed in your country. (Attach additional sheet, if necessary)

If no, give reasons for not adopting them.

3.14.2 Whether your country has the Standard Institution and has developed/developing your own national standards for Sprinkler irrigation equipments?

Yes ☐ No ☐

If yes, give the name of the Standards Institution, year of its establishment and list of standards developed pertaining to Sprinkler irrigation system/equipments.

3.14.3 Whether there is any testing facility for evaluating performance of Sprinkler irrigation system components (e.g. Sprinklers, valves, laterals etc.) as per ISO/CEN or your own standard institution?

Yes ☐ No ☐

If yes, please provide the name and contact addresses of Institutions having testing facilities along with their year of establishments. Please also enclose details of the test facility and Reports/publications of the Institute.

3.15 Performance of SIS

3.15.1 Whether performance evaluation of SIS installed on fields is carried out in your country?

Yes ☐ No ☐

If yes,
What performance evaluation parameters are adopted?

- Field application efficiency (Ea) ☐
- Coefficient of uniformity (CU) ☐
- Any other (pl. specify) ☐

3.15.2 What are the typical or average range of field application efficiencies (Ea), and Co-efficient of uniformities (CU) of SIS, observed in your country.

SIS Type	**Ea %**	**CU %**	**Remarks**

3.16 Training, education and capacity building in SIS.

3.16.1 Whether there is an adequate coverage about SIS at graduate/post graduate level in your country.

Yes ☐ No ☐

If yes, provide list of some important Institutions imparting education about SIS.

3.16.2 Is there any specialized Institution for capacity building in various aspects of SIS?

Yes ☐ No ☐

If yes, give details of the Institutions.

3.16.3 Whether Irrigation/Agricultural professionals receive any training in planning, design, installation and evaluation of SIS?

Yes ☐ No ☐

If yes, give the details of training curricula (please attach separate sheet).

3.16.4 Whether there is facility for training farmers in adoption, operation & maintenance of SIS?

Yes ☐ No ☐

If yes, whether training facility for farmers is adequate?

Yes ☐ No ☐

3.16.5 Has your country held a major conference/workshop/congress/seminar/round table on Sprinkler irrigation in the last 10 years?

Yes ☐ No ☐

If yes, give the details of the events and if possible send a copy of the proceedings or report.

3.17 Are SIS components manufactured in your country?

Yes ☐ No ☐

If yes, please give the list of major manufacturers in your country.
(Attach sheet, if necessary)

3.18 Whether SIS components/units are imported in your country?

Yes ☐ No ☐

If yes, how much is the annual approximate turnover (US$)

3.19 Whether SIS components/units are exported to other countries?

Yes ☐ No ☐

If yes, how much is the annual approximate turnover (US$) and to which countries

3.20 Please provide feedback on the special advantages of adoption of SIS, difficulties faced and lessons learnt in adoption of Sprinkler Irrigation System (SIS) in your country.

Please return the filled-in questionnaire to:

The Secretary General
International Commission on Irrigation & Drainage (ICID)
48 Nyaya Marg, Chanakyapuri
New Delhi 110 021, India

You can also fill in and submit the questionnaire online by visiting www.icid.org.
