

Irrigation Equipment and System Design Policy

Background

Water in the Hashemite Kingdom of Jordan is extremely scarce. The current annual endowment of renewable fresh water is only about 145 cubic meters per person, a value which will decline to worrisome levels in 10 years time as the population continues to grow. This is less than one-fifth of the internationally recognized threshold of water scarcity of 1,000 cubic meters per person per year.

According to several studies, irrigated agriculture consumes about two-thirds of the country's fresh water supply, but its contribution to the GDP is far smaller than this. Moreover, there are growing competitive demands for water from urban areas, industry, and tourism; and irrigated agriculture must become more efficient in using water to allow these demands to be met.

A majority of the fruit and vegetable growers in the country apply water through drip irrigation systems. For example, about 71% of Jordan Valley farmers utilize these systems. In principle drip irrigation is a very efficient way to apply water. Actual results depend on system design, operational practices, water quality and other factors.

Although some irrigation equipment manufacturers, on their own, follow standards to a level that enables the exports of some of their products, drip application and filtration equipment used in Jordan varies greatly in quality, longevity, and price. This affects both farm profitability and water use efficiency. Low quality emitting pipe (GR tubing) may over-irrigate some plants while other suffer from too little water. Cheap GR tubing made with large proportions of poor quality recycled material may only last a season or two and need to be replaced. Industry-wide standards for different classes of tubing and filters would allow farmers to make more informed choices of equipment to purchase.

In addition poor system design also contributes to poor results and inefficient water use. Design skills for drip irrigation systems are limited, and many farmers rely on second-hand advice from other non-professionals in laying out their systems. A targeted course in drip irrigation system design, leading to certification, would help fill this knowledge gap by creating a core crop of qualified professional system designers. These skills could then be disseminated to others, building on a firm base of established design principles and techniques.

Costs and Benefits of Standards

Implementation of standards has both benefits and costs. Benefits include:

- fit and interchangeability of products, both among manufacturers and over time
- communicating to manufactures the product requirements of other countries

- protecting workers from injury
- informing consumers by requiring uniform product descriptions
- insuring that equipment will work effectively and consistently
- the potential to contribute to water savings, increased on-farm irrigation efficiency, and productivity

On the other side of the coin, standards cost money to develop and implement. Implementation costs are incurred by manufacturers in adapting manufacturing processes to comply with the standards and meeting testing and recordkeeping requirements. The standards agency incurs costs to equip a laboratory, to sample products in the market and test them, and to impose penalties for failure to conform.

Consequently, standards should be developed only to meet real and present needs, and not as a matter of routine. Standards should also meet the test of realism – can they be reasonably complied with, and at a reasonable cost to both manufacturers and the standards agency. Standards should respond to a consumer need, and consumers should be willing to bear at least a part of the cost of compliance, which manufacturers will surely pass along to them. Finally, the standards organization should have the resources and capacity to both monitor and test the products being regulated and to apply sanctions for non-compliance.

The Policy

Objective

This policy statement follows from longer-term objectives outlined in the *Water Strategy* and supplements the *Irrigation Water Policy* and the *Irrigation Water Allocation and Use Policy* by establishing a policy on irrigation equipment and system design standards. This new policy is consistent with the *Water Strategy* and is in conformity with its long-term objectives.

On Defining and Updating Equipment Standards

1. A working group shall be established to develop standards for selected types of drip irrigation equipment for use in Jordan. This working group shall consist of irrigation specialists from a wide range of backgrounds, including manufacturing representatives. The working group shall produce a set of recommended standards by the end of 2006.
2. The working group shall develop standards for (a) emitting pipe (“GR”), for (b) both screen and media filtration equipment, and for (c) larger diameter high density polyethylene (HDPE) pipe as used by farmers to connect GR tubing to their water source.
3. The standards for GR tubing shall be separated into three quality categories according to effectiveness and the expected lifetime of the product. These categories shall be designated by one, two, or three stars, or an equivalent scheme.
4. All standards shall include requirements for prominent branding of products so that the manufacturer and the product quality class are clearly identified.

5. The standards for media-type filtration equipment shall cover both the equipment itself and the media, i.e. sand and gravel, to be used in it.
6. Standards for screen and disk filters shall specify screen hole size (mesh) and consider both single and double screen systems.
7. The working group shall review current Jordanian standards relating to these types of equipment as well as ISO standards and national standards from countries including the United States, Australia, South Africa, and Israel to guide development of Jordanian standards.
8. The working group shall review testing procedures and equipment needed to measure and evaluate the quality of products falling under the standards established and shall recommend testing procedures as an integral part of the standards it recommends.
9. Once draft standards are prepared, they shall be subject to the normal Jordan Institute of Standards and Metrology (JISM) approval process.
10. Standards shall be reassessed every 5 years to take account of advances in manufacturing technology and changing market requirements.

On Raising Farmers' Awareness of Standards

11. To effectively guide equipment choices, information on standards must reach a majority of the farmers who purchase the equipment. A media campaign utilizing television, radio, and newspapers shall be employed to raise awareness of the new standards, once they are approved.
12. Training courses shall also be organized for extension agents and for irrigation equipment dealers to make them aware of the new standards and their content. Training courses shall include life-cycle cost analysis to allow realistic comparison of alternative types of equipment.

On Testing and Enforcement of Standards

13. Drip equipment manufacturers shall be encouraged to form an association to manage quality assurance and voluntary compliance with the new standards.
14. A central laboratory shall be established with the capability to measure and assess compliance of products governed by the standards.
15. The standards agency shall regularly test product samples purchased on the open retail market for compliance with the quality and branding provisions of the standards.

On Training and Certifying Drip System Designers

16. A working group shall be established to develop learning objectives and a training course curriculum leading to certification in drip irrigation system design (and operation and maintenance, O&M). This working group shall include engineering educators and drip irrigation equipment manufacturers, among others.
17. A “certifying authority” is an institution which issues a certification and stands behind its quality. This authority need not be a public agency and usually is not a public agency. It must be an agency with sound technical credibility that

will extend to the certificate which it endorses. The working group shall consider different options for a certifying authority, negotiate with its preferred choice, and reach agreement with it.

18. One or more of the universities will be encouraged to offer a certification training course for drip irrigation system designers (including O&M requirements for system performance). The target audience could include engineers from the National Center for Agricultural Research and Technology Transfer (NCARTT), extension service staff at MoA, engineers employed by drip irrigation manufacturers and equipment dealers, farmers, and consulting engineers working in the field of irrigation. The course could be fee-based and open to any applicants with the necessary engineering background.
19. Universities shall be encouraged to incorporate the learning objectives and course content into their undergraduate engineering programs as an “irrigation elective” which will result in new engineering graduates receiving design certification along with their engineering degrees if they so choose.

Institutional Responsibilities

20. As the body authorized to approve standards, the Jordan Institute of Standards and Metrology will set the membership of the Equipment Standards Working group. Members could include representatives of Jordanian irrigation equipment manufacturers, NCARTT, the Ministry of Agriculture, Jordan University of Science and Technology, University of Jordan, and the JVA.
21. Membership of the Designer Certification Working group could include Jordan University of Science and Technology, the University of Jordan, representatives of Jordanian irrigation equipment manufacturers, the Jordan Valley Authority, the National Center for Agricultural Research and Technology Transfer, and the Ministry of Agriculture.
22. Raising farmers’ awareness of the new equipment standards could be led by NCARTT in conjunction with the MoA extension service, and by the equipment manufacturers association to be established under this policy.
23. Quality assurance would be the responsibility of the manufacturers’ association, while external testing and enforcement could be undertaken by JISM on a fee for service basis.
24. Technical and financial support from donor agencies such as USAID, GTZ, MREA, and other donor agencies would be a welcome and useful contribution to all of the above activities. In particular, support would be useful for developing the system design certification course and for scholarships supporting initial batches of trainees participating in the courses.
25. Capital investment would be required for some activities called for in this policy. In particular, equipping a central laboratory for quality control testing will require such investment.
26. A surcharge on equipment sold should be considered to support certification, testing, enforcement, and quality assurance where the funding currently available to JISM and the manufacturers association is inadequate.