



Ministry of Water and Irrigation
Jordan Valley Authority
Reclaimed Water Project



Proposed steps to a Crop Quality Assurance System

with focus on irrigation water quality
in the Jordan Valley



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1. Abbreviations

EU	European Union
EUREPGAP	Euro-Retailer Produce Good Agricultural Practices
FAO	Food and Agriculture Organisation of United Nations
GAP	Good Agricultural Practice
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit (German Technical Cooperation)
HACCP	Hazard Analysis Critical Control Point
JEPAFV	Jordan Exporters' and Producers' Association for Fruit and Vegetables
JEDCO	Jordan Export Development and Commercial Centers Corporation
JFDA	Jordan Food and Drug Administration
JISM	Jordan Institution for Standards and Metrology
JVA	Jordan Valley Authority
MoA	Ministry of Agriculture
MoH	Ministry of Health
NCARTT	National Center for Agricultural Research and Technology Transfer
QA	Quality Assurance
RWP	Reclaimed Water Project
WHO	World Health Organisation

2. Introduction

2.1 One of the main objectives of the Reclaimed Water Project (RWP) is to ensure, that there is no negative impact of agricultural irrigation, which at least partly uses treated wastewater, on groundwater, soil and crops in the Jordan Valley. This includes facilitating marketing of fruit and vegetables grown in the Jordan Valley, especially for export into Western Europe, where higher prices can be obtained [4]. Some of the leading farmers have already achieved this. Consumers in Western Europe and elsewhere are demanding ever higher standards of food safety and quality. EU food law and commercial buyers' specifications reflect this concern. In order to ensure consistent compliance with the law and with commercial specifications, it is essential for farmers to have some form of quality assurance system linked to hazard analysis. This has been confirmed by other donor funded studies in Jordan [6].

2.2 Given the potential contamination hazards, it is particularly important for the growing, harvesting and handling of fruits and vegetables irrigated with treated wastewater, even in a diluted form, to be subject to a robust quality assurance system.

2.3 The recent development of international crop (or produce) assurance schemes has provided a practical way for farmers to implement and manage systems that integrate quality management with risk analysis, environmental protection and worker safety. Some schemes provide for farmer group certification. This allows groups of small farmers to be registered for certification through centrally managed, administered and audited systems.

2.4 It should be emphasised that quality assurance is an industry initiative, to be implemented and operated by the private sector. It is not a legal requirement. EU food law clearly places the responsibility for safe food with the food industry.

2.5 Industry quality assurance has an important role in assuring food safety. Where farms have quality assurance systems, EU inspectors, for example, can adjust their approach to enforcement accordingly [8]. For those businesses not covered by assurance schemes, which at present is the case with the vast majority of the farms in the Jordan Valley, state monitoring and inspection is the main protection against public health hazards. The JVA-GTZ Working Group on State Crop Monitoring is working on recommendations for improvements on state crop monitoring which should result in an effective system of monitoring when implemented.

3. Background and Overview

3.1 This mission was related to three components of the Reclaimed Water Project (RWP): (i) a “safety control guideline for fresh fruit and vegetables”, (ii) a “state crop monitoring system” and (iii) “steps to a crop quality assurance system”.

3.2 The main Jordanian bodies responsible in this area are the Ministry of Health (MoH), the Jordan Food and Drug Administration (JFDA), the Ministry of Agriculture (MoA) and the Jordan Exporters and Producers Association for Fruit and Vegetables (JEPAFV).

3.3 In a previous mission in 1996 for the Amman Agricultural Marketing Organisation and GTZ, Dr Martin Dietz had considered possible chemical and microbiological hazards in relation to fruit and vegetable production in Jordan [1]. He suggested preventive measures and a system to implement and monitor these measures. The recommendations contained in this report are fully in line with Dr Dietz’s report.

3.4 The present mission has a narrower remit than Dr Dietz, in that it is concerned with fruit and vegetables irrigated with diluted treated wastewater. However, any quality assurance system will not be confined solely to the irrigation aspect. That said, the microbiological and chemical safety of the irrigation water is, of course, potentially critical for the safety of the products.

3.5 This mission was undertaken in tandem with GTZ Consultant Mrs Margaret Will who was concerned with national and international produce standards and recommendations for the development of a Jordanian guideline as a basis for a systematic state monitoring program on crop quality. Therefore this report should be read together with Mrs Will’s reports: “*RWP – Info: Review of European standards on selected fruits and vegetables*” [12] and “*RWP – Info: Recommendations on setting a safety control guideline for fresh fruit and vegetables with special reference to irrigation water related parameters*” [13].

3.6 Mrs Will’s pre-visit research [12] had established that there are no standards explicitly related to the use of treated wastewater or diluted treated wastewater for irrigation, although a number of chemical and microbiological parameters in EU and international law and guidelines are relevant to contaminants that could be derived from contaminated irrigation water.

3.7 There is international concern over the potential contamination of fruit and vegetables from contaminated irrigation water. There have been large outbreaks of infectious intestinal disease in the UK and other countries worldwide, traced to the consumption of contaminated fruits and vegetables e.g. salmonellosis due to contaminated iceberg lettuce. There is also a certain amount of emotive consumer concern over what might be presented as the

use of marginal water qualities or 'treated sewage' for crop irrigation, both domestically in Jordan and internationally.

3.8 There was a strong feeling among some of those who were met during the mission that it would be wrong to create a 'two class' system, one for the Jordanian domestic market and one for export. Jordanian consumers are entitled to the same standards of health protection as those in export markets.

3.9 In order to address these concerns, the use of treated wastewater and diluted treated wastewater for the irrigation of fruits and vegetables should be subjected to a scientific risk assessment for each type of crop, taking into account the characteristics of the crop, the method of application of the water and the quality of the water. The Jordanian legal regulation [3] prohibiting the use of reclaimed irrigation water for vegetables that are eaten uncooked (raw) is an example of a risk based control. The hazards identified will need to be closely managed and assurance provided to confirm that they are under full control all the times.

4. Quality Assurance

4.1 Quality Assurance (QA) in the food industry has largely arisen in order to meet consumer demand for safe food of consistent quality. Quality is not a finite property; it has no single definition. QA is about systems designed to provide assurance that whatever parameters are chosen can be delivered consistently all of the time. QA systems are usually designed to assure compliance with both legal requirements and commercial specifications. In relation to foodstuffs there is a close link between QA and the Hazard Analysis Critical Control Point (HACCP) concept. HACCP is required in EU food hygiene law, but only *after* the food has left the 'farm gate'. Commercial specifications may require a form of HACCP on farms. Some leading authorities on HACCP say that HACCP use is increasing in the primary production sector, but has not been well established historically [7]. However, farmers should have some form of crop assurance linked to hazard analysis in place.

Why is QA important for fruit and vegetable growers in Jordan?

This is perhaps best answered in the report "Assessment of Jordanian Marketing System for Fresh Fruits and Vegetables" [6]. It makes a number of recommendations aimed at improving quality and promoting exports. The report says that "the increasing importance of produce quality and safety requires that farmers supplying exporters to the EU become EUREPGAP certified".

It could be added that it is even more important where treated wastewater, even in a diluted form, is used for irrigation.

4.2 Advanced forms of quality assurance certification such as those contained in the ISO 9001:2000 series, may be too demanding in terms of time, cost and complexity for small farmers such as those forming the majority in the Jordan Valley. The full implementation of the HACCP approach is also proving difficult for small businesses. This is reflected in the recently adopted EU Regulation on food hygiene [9] which does not require full HACCP at the farm level.

Some recently developed international assurance schemes (e.g. EUREPGAP) are designed as a practical way for farmers to satisfy industry requirements for QA, Good Agricultural Practice (GAP) and HACCP based controls.

It should be emphasised that QA is an industry responsibility not a legal requirement.

4.3 Discussions were held with senior representatives of the leading government and non-government bodies with an interest in this Reclaimed Water Project (except the Farmers Union who were not available at the time). In addition, the reports from the other donor funded missions cited above were reviewed.

In this above mentioned report [6] it is said that 'there is general agreement that there is a need for a private sector institutional body capable of organizing exporters and farmers and delivering needed services to increase productive capacity, high quality production, and expanding market linkages

to export buyers'. It is suggested that JEPAFV would be the appropriate body, with the reservation that JEPAFV as currently structured, financed and operated cannot serve this purpose. The report suggests that JEPAFV must be revitalized and strengthened if it is to be effective in expanding production and exports of high quality produce.

An election to Board membership of JEPAFV took place while the mission was in Jordan and the author had the impression that the change in Board membership will facilitate this process. Certainly, the newly elected Board members the mission met were very positive and enthusiastic about the proposed role for JEPAFV in crop assurance.

4.4 Among those interviewed general agreement was found that the most appropriate body to take this initiative forward is JEPAFV. There was also unanimous agreement on the need to improve standards through crop assurance certification in order to improve export opportunities.

4.5 All of the farming and business representatives the author met were of the view that the most effective way of extending assurance certification to a greater number of farmers is through the 'outgrower' or 'satellite farmer' approach (also referred to as 'contracting' or 'pre-contracting'). It was mentioned that the wholesale markets in Jordan operate to the disadvantage of farmers and do not help to promote high standards of quality. The farmer group approach has the potential advantages of helping the smaller farmers with marketing, especially in export markets and enabling the farmer group certification process.

The establishment of farmer groups calls for mutual trust among the members which will need to be supported by adequate legally binding contractual arrangements. The large farmers and commercial representatives the author met did not seem to think this will present a major obstacle. It is apparently already working satisfactorily in the case of *Modern Valley Farms*. The above mentioned report [6] says that most of the original 22 farmers in the Modern Valley Farmers Group were unable to adhere to EUREPGAP standards, but they are now better prepared to expand from the current group of 4 satellite farmers. A large strawberry grower we met also advocates the farmer group certification approach as the way forward. He is currently studying EUREPGAP.

4.6 The Jordan Institute for Standards and Metrology (JISM) is the Government Certification Body for fruit and vegetables. It has produced a Jordan Standard Water: Reclaimed Domestic Wastewater [3] which sets out chemical and biological parameters for reuse treated wastewater in irrigation. The JISM officials who were interviewed felt that it was for JISM to take the lead with the MoA in promoting crop assurance. This seems to overlook the fact the crop assurance must be an industry initiative. Moreover, JISM is not registered with any crop assurance scheme as a Certifying Body. Nor does it employ specialists in horticulture as required by most schemes for a Certifying Body. However, given the present weaknesses in JEPAFV as identified in the report [6], the MoA and possibly JISM could play a positive role in helping to encourage a more proactive role for JEPAFV and generally helping to drive up standards.

4.7 The fact that quality assurance is an industry responsibility does not mean that there is no role for the government. In Jordan where agribusiness accounts for a high percentage of GDP and also for the fresh fruit and vegetable sector it is important for the responsible government bodies to encourage the establishment of a high quality image for Jordanian produce. Food poisoning outbreaks linked to farm produce, as mentioned above, can have a devastating effect on export opportunities.

4.8 JEDCO, a private/state organisation under the Ministry of Industry and Trade has an active export promotion project for fruit and vegetables. The project includes:

- study tours for farmers
- trade fairs
- development of a National Standards Manual for exporters, including legal requirements for different markets
- development of a database for fruit and vegetable production, including varieties grown, export markets and data on quantities exported
- identifying obstacles to exports
- EUREPGAP training for about 15 farmers, provided by a Dutch Company, the Centre for Promotion of Imports (CBI).

5. State Crop Monitoring

5.1 As already mentioned, quality assurance is an industry function. The *State* is responsible for protecting public health and preventing fraud by implementing appropriate food laws and ensuring their enforcement. The State also has an interest in promoting the commercial viability of industry, including agriculture. In addition, the State will need to ensure that adequate surveillance and research are undertaken, either directly or indirectly, in order to inform its food safety decision making.

State crop monitoring may be carried out for several different reasons, including sanitary, phytosanitary and marketing standards. This report is concerned with safety and health, not marketing standards or phytosanitary standards.

5.2 Although not all the relevant Jordanian laws have been seen, the author had meetings with senior officials of MoH and MoA. The mission has also seen a paper giving the results of a JVA-GTZ Working Group “Crop Monitoring” and we attended a meeting of that Working Group where a presentation was given on the results of pesticides residues monitoring over seven years from 1996 – 2002. The results for samples containing residues in excess of MRLs ranged from 0.3 % to 2.1 %. Bearing in mind that if pesticides in excess of MRLs are detected in produce on sale in EU Member States, a rapid alert may be issued by the EU Commission to all Member States; such levels of contamination are not acceptable for export consignments.

5.3 The Working Group works on a proposal for a State Crop Monitoring System and sets out a range of chemical and microbiological parameters for consideration. The MoH, the JFDA and the MoA are identified as having the leading roles in this sampling program. The already existing MoA sampling program is reported as running well. Its main target is to improve the crop marketing and to “prove the absence” of prohibited pesticides. The Working Group has made recommendations for the improvement of the sampling process.

5.4 On the question of “proving absence” it is important here to stress the limitations of end product testing as a means of proving safety. Dr Dietz summarises this very clearly in his 1996 paper [1]. In essence, while a negative result may prove the absence of the contaminant in a particular sample, that certainly does not prove absence in the whole consignment or more widely. One of the reasons for this is the heterogeneous distribution of contaminants and the difficulty in collecting representative samples. There is a place for state crop sampling as a useful source of data and trend plotting, but it is important not to be led into believing that absence of contaminants in some samples is necessarily proof of absence more widely. State crop monitoring, providing it is properly enforced, does however serve as a warning to farmers to comply with the law.

5.5 The regular inspection of farms to ensure compliance with legal requirements and GAP (including checks on the application of irrigation water)

is a more effective means of assuring safety than sampling. The role of end product sampling should not be over-emphasised: Taking only a few samples per week from a pool of over 3,000 farmers will provide a very small probability of detecting non-compliance.

5.6 There is no single, agreed international model for state crop monitoring against which the Jordanian model to be established can be measured. Even within the EU, the food law enforcement systems vary widely between the Member States. There is, however, a strong trend globally (supported by WHO/FAO) towards the formation of State Food Safety Agencies at national level. These vary in their responsibilities and the Government Departments to which they report. The parent Minister is usually the Health or Agriculture Minister. In most cases, Health Ministers are seen by consumers (rightly or wrongly) to be more objective in balancing the protection of public health against the economic interests of the food and agriculture industries than Agriculture Ministers. In some countries the Food Safety Agencies are government bodies that are completely independent of ministerial control.

5.7 In many countries, the monitoring of food, i.e. sampling for chemical or microbiological analysis, for compliance with statutory standards and codes takes place mainly at the point of retail sale. There is little available guidance on the number of samples to be taken by food control authorities. A rough guide of between 2 and 5 samples per thousand of the population per year has been used in some countries, but this is of little relevance to the situation in the Jordan Valley. Health Ministries do not often get involved in sampling at farm level. In countries such as Jordan where the agricultural industry is a significant contributor to the GDP, agriculture ministries may take on a more active monitoring role at farm level in order to help ensure compliance with quality and marketing standards. The inspectors employed for farm visits should be qualified in horticulture. However, the trend is more towards industry operated 'farmer assurance' programs, sometimes linked to 'Seals of Quality' or other logos that can be placed on produce packaging. Traceability is an important feature of such schemes.

5.8 JFDA has expertise in applying a risk assessment approach to its imported food sampling program. This expertise should be brought to bear on the development of the state crop monitoring and inspection program for fruits and vegetables grown in the Jordan Valley, especially in the areas where diluted treated wastewater is used for irrigation.

This program should include risk related sampling plans and arrangements for sampling and conveying samples to laboratory, but acknowledge limitations of end product testing for safety assurance.

5.9 In devising a state crop monitoring program, it may be helpful to take into consideration the recently adopted EU Regulation on the Hygiene of Foodstuffs [9]. Annex I of this Regulation sets out general hygiene provisions for primary production and associated operations. The EU Regulation on official controls performed to ensure the verification of compliance with feed and food law [8] is particularly relevant to state crop monitoring. These two

Regulations are key elements of the EU food safety strategy and reflect the latest policy on food control.

5.10 A program of accreditation for all laboratories involved in official crop analysis should be developed by the government departments responsible for the laboratories, or in the case of private laboratories by the management.

5.11 A risk related hygiene and safety standard for harvesting, handling, packaging, transport and storage of produce should be developed jointly by MoA, MoH, JFDA, JISM and JEPAFV.

6. Conclusions and Recommendations

6.1 It is recommended that quality assurance certification by an appropriate body for fruit and vegetables irrigated with diluted treated wastewater should be promoted in the Jordan Valley as a means of helping to access foreign markets, especially in Western Europe. For the small farms in the Jordan Valley, Farmer Group Certification should be explored. This certification will not guarantee acceptance in all cases, as individual commercial buyers may have their own specific standards. However, the certification standard should be designed to be a framework which can form the basis for the addition of more specific requirements.

6.2 Quality assurance is an industry initiative and it should be implemented in Jordan primarily through private sector organisations. In addition, there are roles for Government Departments to facilitate and encourage the adoption of assurance schemes by the farming industry e.g. by funding the provision of training and consultancy advice.

6.3 There are also possibilities for the JVA/GTZ RWP to provide assistance through, for example

- developing GAP and quality assurance manuals
- facilitating training and visits to other countries to see assurance schemes in operation
- helping with pilot Farmer Group Certification projects
- supporting awareness campaigns for environmental, health and exporters organizations addressing farmers' use of diluted treated wastewater and handling of agricultural produce.

6.4 The Jordan Exporters and Producers Association for Fruit and Vegetables (JEPAFV) would seem to be the appropriate body (subject to the availability of adequate funding) to take the lead in promoting crop quality assurance. A number of Government Departments and NGOs have an interest in the safety and profitability of farming in Jordan and it is essential that all these stakeholders are fully involved at all stages in the development of the initiative.

6.5 For the small farmers who form the great majority of farmers in the Jordan Valley, it is recommended that the Farmer Group Certification approach should be adopted. The mission was informed that there are about 10-15 'innovative farmers' who may be prepared to act as the 'lead farmers' who will take the initiative in contracting with other, probably smaller farmers, to form groups for certification purposes.

6.6 The implementation of quality assurance certification will be a gradual process over a number of years. While it is becoming established in the Jordan Valley there should be a program of initiatives aimed at gradually educating and encouraging the JV farmers to adopt Good Agricultural Practice.

6.7 The number of farmers implementing the former JVA-GTZ Integrated Pest Management Project (IPM-Project) appears to be declining owing to a lack of tangible financial benefits for the farmers. It is important that the proposed quality assurance initiative is closely linked to marketing opportunities so that more farmers will clearly see the benefits and thus be encouraged to join in.

6.8 During a Discussion Meeting on April 29, 2004 at the Marriott Hotel / Amman, the main ideas of this report were discussed with representatives of JVA, MoH, JFDA, MoA, NCARTT, JISM, JEPAFV, JORICO, JEDCO, Dajani Agribusiness, Modern Valley Farms, Farmers Union, Farmers from the Jordan Valley.



Discussion Meeting on 29th April 2004, Marriott Hotel / Amman

6.9 Action Plan:

Actions to be carried out by JEPAFV:

- Identify the various relevant donor funded initiatives and liaise with donors to ensure best use of resources
- Set up GAP/Crop Assurance Steering Group with membership from JVA, MoA, MoH, JISM, JEDCO, JFDA and other appropriate bodies
- The Steering Group should appoint a smaller Implementation Working Group to develop the detailed and technical aspects of the project
- Publicise the initiative among the Jordan Valley farming community
- Develop a Jordanian GAP/crop assurance manual for farmers with special reference to use of marginal irrigation water quality
- Identify appropriate international GAP Crop Assurance Standard and establish dialogue with Accreditation Body
- Identify appropriate national or international Certifying Body or Bodies
- Identify Jordanian or international GAP/crop assurance consultants to assist farmers with preparation for certification
- Develop guidelines on formation and operation of Farmer Groups for certification purposes
- Identify potential 'lead' farmers who could initiate 'Farmer Group Certification'
- Arrange programme of training for Jordan Valley farmers on GAP/crop assurance
- Secure adequate funding for this initiative from membership and/or Government

Actions to be carried out by Reclaimed Water Project (RWP):

- If necessary, encourage JEPAFV to accept their leading role
- Provide assistance with farmer training on GAP/crop assurance
- Arrange study tours for Jordan Valley farmers to see crop assurance in action in other countries
- Support development of GAP/crop assurance manual for fruit and vegetables irrigated with water of marginal quality
- Support awareness campaigns of environmental, health and exporters organisations addressing farmers on the use of diluted treated wastewater and handling agricultural produce
- Seek support of Ministries at high level; explore and implement possibilities for Government financial support for JEPAFV projects; help agreeing which should be the lead Government Agency to support JEPAFV with GAP/crop assurance

6.10 Several foreign donor bodies are currently funding initiatives in the fruit and vegetable growing sector, some of which appear to be, or are at least potentially, overlapping. In order to maximise the value of these inputs there is a need for coordination and close cooperation to maintain an overview of all activities.

7. References

- [1] Dietz,M.: Development of a Quality Assurance System for Fruit and Vegetable Production in Jordan, AMO-GTZ Export Promotion Project, Amman 1996
- [2] FAO/WHO: Assuring food safety and quality: Guidelines for strengthening national food control systems, FAO Food and Nutrition Paper (76), 2003
- [3] Jordan Institution for Standards and Metrology (JISM): Jordanian Standard JS 893/2002 "Water – Reclaimed Domestic Wastewater", Amman 2002
- [4] Jordan Valley Authority (JVA) / German Technical Cooperation (GTZ) – Reclaimed Water Project (RWP): Baseline Report, Amman 2003
- [5] Long,S.; Adak,G.; O'Brien,S.; Gillespie,I.: General outbreaks of infectious intestinal disease linked with salad vegetables and fruit, England and Wales, 1992-2000, Communicable Disease and Public Health 2002; 5: p. 101-105
- [6] Magnani,R.; Assad,R.; El-Habbab,S.: Assessment of Jordanian Marketing System for Fresh Fruits and Vegetables, JVA-USAID Kafa'a Project, Amman 2004
- [7] Mortimer,S.; Wallace,C.: Food Industry Briefing Series: HACCP, Blackwell Science, 2001 (ISBN 0-632-05648-7)
- [8] Regulation (EC) No 882/2004 of the European Parliament and of the Council of 29 April 2004 on official controls performed to ensure the verification of compliance with feed and food law, animal health and animal welfare rules
- [9] Regulation (EC) No. 852/2004 of the European Parliament and of the Council of 29 April 2004 on the hygiene of foodstuffs
- [10] UK Chilled Food Association: Microbiological Guidance for Produce Suppliers to Chilled Food Manufacturers, 2002 (ISBN 1-901-79803-8)
- [11] Websites:
 - Eurepgap: <http://www.eurep.org>
 - Irish Horticultural Board: <http://www.bordglas.ie>
 - UK Fresh produce Consortium: <http://www.freshproduce.org.uk>
 - UK Chilled Food Association: <http://www.chilledfood.org>
- [12] Will,M: RWP – Info: Review of European standards on selected fruits and vegetables, JVA-GTZ Reclaimed Water Project RWP, Amman 2004
- [13] Will,M: RWP – Info: Recommendations on setting a safety control guideline for fresh fruit and vegetables with special reference to irrigation water related parameters, JVA-GTZ Reclaimed Water Project RWP, Amman 2004
- [14] Will,M.: Food Quality and Safety Standards as required by EU Law and the Private Industry – with special reference to the MEDA countries' exports of fresh and processed fruit & vegetables, herbs & spices; edited by German Technical Cooperation (GTZ), GTZ Headquarter Eschborn/Germany, 2003