FAO/GFAR Global Initiative on Post-harvest
Phase 1

Summary Report of the Regional Workshop for
The
West Asia North Africa (WANA) Region

Cairo, Egypt
4-6 February 2002

Organized by AARINENA

Prepared by: Dr. Elhadi M. Yahia
21 March 2002
THE WANA REGION

Sub-Regional Classification

The WANA region is divided into 5 sub-regions (Figure 1):

1. The Maghreb sub-region which includes Algeria, Libya, Malta, Morocco and Tunisia.
2. The Nile Valley and Red Sea sub-region which includes Egypt, Sudan and Yemen.
3. The Mashreq sub-region which includes Cyprus, Jordan, Iraq, Lebanon, Palestine and Syria.
4. The Arabian Peninsula sub-region which includes Kuwait, Oman and the United Arab Emirates.
5. West and Central Asia sub-region which includes Iran and Pakistan.

Characteristics of the WANA Region

- The region is arid area with extremely poor water resources.
- The region is rich in indigenous plant genetic resources, but most of its diversity is threatened by erosion, and many other environmental problems.
- Food production is very low, and varies widely across countries. Approximately 35 million metric tons of cereals are produced annually in the region while approximately 55 million metric tons are consumed. Similarly, approximately 52 million metric tons of fruits and vegetables are produced annually, while almost 80 million metric tons are consumed.
- The region is a “food deficit” region, and is the largest “net food importer” among developing countries.
- Approximately 60% of the region’s population is rural and is dependent on agriculture for a livelihood. Decreasing agricultural production has a negative impact on food security, as well as on efforts toward poverty alleviation.
- Food consumption in general, including the consumption of fruits and vegetables, is increasing due to increased population growth and urbanization, but it is still generally low compared to that in other regions.
- Post-harvest food losses in the region are very high, and estimated to exceed 30%. Post-harvest food losses are even higher in government and quasi-government companies and fields due to poor management, lack of technical experience, lack of/or poor planning, lack of motivation, inadequate maintenance, etc.
- The post-harvest sector in the region is deficient in infrastructure and facilities, in trained personnel, in appropriate technologies and in investment.
- There is excellent potential for export, especially to the European and Gulf markets. However, improvement of the export sector will require major improvements in the production systems and in the post-harvest sector.
- There is a strong need for the enhancement of agricultural and rural development in the region through fostering agricultural research and technology development, and by strengthening collaboration intra- and extra-regionally.
- There is a clear gender inequality, and particular interest should be directed toward the development of women, especially in rural areas.
EXECUTIVE SUMMARY

The Agro-Industries and Post-Harvest Management Service of FAO (FAO/AGSI) with the endorsement of Ph-Action, has launched an international initiative geared toward facilitating development within the post-harvest sector in developing countries. This initiative will be implemented in three phases:

- **Phase 1.** Development of a global perspective of the post-harvest sector, through the planning and implementation of five coordinated technical regional workshops. The current workshop held in the WANA region was the third of these workshops to be implemented.

- **Phase 2.** The conduct of a five-day International Consultation on Post-Harvest, with the objective of obtaining the endorsement of a plan of action for a Global Initiative on Post-Harvest (GIPh).

- **Phase 3.** The launching of a Global Initiative on Post-Harvest (GIPh).

Activities within Phase 1 are fully funded by FAO/AGSI and are being implemented in cooperation with the Global Forum for Agricultural Research (GFAR).

The workshop for the WANA Region was a Phase 1 activity, and was organized through collaboration between The Association of Agricultural Research Institutions in the Near East and North Africa (AARINENA), FAO/AGSI (Rome), GFAR (Rome), and FAO-RNE (Cairo). It was hosted by the Agricultural Research Center (ARC) of Egypt and implemented in Cairo, Egypt during the period 4-6 February 2002. This Workshop was the first formal gathering of post-harvest experts from the WANA region, and indeed a very positive step toward development of the post-harvest sector in the region. Participants were all hopeful of the development of further collaboration as an outcome of this study and workshop. Nineteen (members of AARINENA) of the 29 countries in the West Asia North Africa (WANA) region participated in and/or contributed to the Workshop.

Highlights of the Workshop included the presentation of five sub-regional background papers (Maghreb, Nile Valley and Red Sea, Mashreq, The Arabian Peninsula and West and Central Asia) as well as stakeholder presentations on food safety, education, post-harvest systems, marketing, education, and research and development. These presentations were followed by working group deliberations.

Major outcomes of the Workshop were:

- An agreed goal and purpose for the post-harvest initiative in the WANA region.
- Sub-regional strategies to achieve the purpose and thus contribute to the overall goal.
- Priority thematic areas, with concrete activities that can be undertaken by the GIPh.
- Sub-regional priorities for the post-harvest initiative.
INTRODUCTION

The Agro-Industries and Post-Harvest Management Service of FAO (FAO/AGSI) with the endorsement of Ph-Action, has launched an international initiative geared toward facilitating development within the post-harvest sector in developing countries. This initiative will be implemented in three phases:

- **Phase 1.** Development of a global perspective of the post-harvest sector, through the planning and implementation of five coordinated technical regional workshops.
- **Phase 2.** The conduct of a five-day International Consultation on Post-Harvest, with the objective of obtaining the endorsement of a plan of action for a Global Initiative on Post-Harvest (GIPh).
- **Phase 3.** The launching of a Global Initiative on Post-Harvest (GIPh).

Phase 1 of this initiative was funded by FAO and implemented in cooperation with the Global Forum for Agricultural Research (GFAR).

THE WORKSHOP

The Workshop convened in the WANA region (WANA Workshop) was the third regional workshop to be implemented. It was organized by AARINENA and hosted in Cairo, Egypt, by the Agriculture Research Council (ARC), during the period 4-6 February 2002. A Regional co-ordinator, 5 sub-regional consultants, and 17 stakeholders contributed to the preparation of background papers for the workshop.

Major inputs to the Workshop included: sub-regional reports prepared by experts from the Maghreb, Nile Valley and Red Sea, Mashreq, Arabian Peninsula, and West and Central Asia sub-regions (3 of these 5 reports were presented at the workshop, since 2 of the sub-regional consultants were not able to attend); seventeen stakeholder papers (16 of these papers were presented at the workshop) covering a diversity of topics such as food safety, nutrition, the status of production and handling of crops grown in the region, post-harvest infrastructure, research and development, status of the private sector and marketing.

Working group deliberations followed sub-regional presentations and stakeholder papers. The first working group exercise involved the grouping of participants on the basis of sub-regional origin in order to conduct an analysis of Strengths, Weaknesses, Opportunities, and Threats (SWOT) in each of the 5 sub-regions, and to come up with strategies for post-harvest development in each region. A card-writing exercise was then conducted in order to identify thematic areas for discussion and deliberation. Five major thematic areas were identified:

- Infrastructure
- Education/research/training
- Marketing
• Quality standards and policy legislation.
• Information and networking

This report reviews the activities of the Workshop and, highlights key issues and conclusions of working group deliberations.

A. BACKGROUND PAPERS

SUB-REGIONAL REPORTS

Issues Emerging From Sub-Regional Reports
This synthesis highlights a number of trends and issues identified in each of the 5 sub-regional reports.

Trends

• Food security continues to be a major issue in the region. Low agricultural production in most of the region, and high post-harvest losses in the entire region, have resulted in great dependence on importation in several countries of the region (particularly in the Maghreb and the Arab Peninsula sub-regions).

• Demographic factors—Although, continued population growth and very rapid urbanization rates, with changing food habits provide opportunities for up-grading products and for the development of more convenience-oriented food products, these demographic factors are of major concern in that they generate an increased demand for food, and increase food security concerns.

• Food safety is of great concern in the region. Although quality standards exist in some countries within the region, they are rarely utilized. There is a need for the development and improvement of quality control systems in the region, and for enforcement of their use. Similarly, there is a need to update and enforce food control regulations.

• Gender and Equity: Gender inequality and difficulties faced by women, particularly in the rural areas of the region still pose economic and social problems in the region. The very high level of illiteracy rates among women, as opposed to men, also poses a problem.

Priority constraints

• Lack of market-oriented farming systems due to the dominance of small agricultural holdings, the absence of functional farmer/exporter cooperatives or associations, and the lack of important marketing firms.

• Scarcity of water resources, poor water quality, and water conflicts are major obstacles to food production.

• Lack of sufficient and adequate post-harvest infrastructure, inappropriate traditional post-harvest practices, reluctance of producers/distributors to adopt new and improved
technologies. This is true in almost all countries of the region in areas of research, training, and for commercial handling of food: storage facilities, transport, marketing, distribution, communication, etc.

- **Poor marketing channels**: poor marketing facilities, infrastructure, management, information technology and information sharing, etc.
- **Lack of marketing information and market orientation**: Existing marketing systems are fragmented and function poorly.
- **Inadequate maintenance of available infrastructure and facilities**.
- **Poor R & D in post-harvest in the region**: Very poor investment in R&D, very poor research, education and training programs oriented to solve post-harvest problems.
- **Inefficient/unavailability of post-harvest extension systems** in the region.
- **Shortage of trained human resources** at all levels of the post-harvest sector: research, education, training, extension, supervisors, technical personnel, etc.
- **Lack of consumer awareness of food safety issues** and of the health benefits of consuming fresh fruits and vegetables.
- **High costs of production and post-production inputs**.
- **Poor access to information**, particularly information on post-harvest in local languages.
- **Unclear, inadequate or inflexible government policies/legislation** in support of the post-harvest sector in most countries of the region.
- **Poor inter-regional collaboration** at all levels: commercial, research, education, training.
- **Managerial constraints**, particularly in public institutions and companies: poor organization, lack of coordination, and absence of planning.
- **Negligence and inadequate use of resources/funds**.

**Priority opportunities**

- **Vast bio-diversity, diverse climates in the region, diversity of products**.
- **Availability of land and labour**.
- **Strategic geographical position, closeness to markets**.
- **Opportunity for food trade exchange within the countries of the region**.

**Priority areas for action**

- **Reducing post-harvest losses** and improving production systems, so as to **increase food availability**.
- **Market-oriented production, market infrastructure and market information/intelligence services**. There is a need to reorient the production sector from its current supply-driven production mode to a market-oriented one. An effective market information service is key to improving the production and marketing decisions of farmers, traders, exporters, and consumers. Such a service should be organized and managed in a way that ensures the provision of reliable and timely market information that responds to the specific needs of clients and assists them in taking their daily marketing decisions. The system should also be able to identify and address information gaps and respond to
future information needs. Adequate market infrastructure, and better management and organization of local markets are also desperately needed.

- **Food safety and quality.** There is a need for the establishment and implementation of safety procedures and quality standards. Intensive and constant/consistent educational programs for consumers related to the nutritional and health benefits of clean horticultural crops, and the possible health risks of contaminated products, are desperately needed in the Region.

- **Increased public-private sector collaboration.**

- **Capacity building including human resource development. Promotion of post-harvest education and training, especially for producers, distributors, consumers, exporters and importers.**

- **Co-ordinated research programs.** Priority should be given to the promotion of research and development. Universities and research institutes should give priority to applied research programs which should cover aspects of direct concern to producers, consumers and exporters.

- **Government Policies: Adoption of new governmental policies and legislation for improving agriculture, with emphasis on the post-harvest sector. Current governmental policies and legislation hinder development of the post-harvest sector, since they accord higher priority to the production sector.**

- **Public sector investment in food production, preservation and distribution.**

- **Credit:** There is a need to create credit institutions for the provision of soft long-term loans for financing marketing infrastructure. The introduction of new production technologies and the establishment and/or the upgrading of present facilities to meet the demand of increasing sophisticated markets require large investment which is beyond the capability of most farmers, agribusiness enterprises and exporters.

- **Export Promotion Strategies:** An effective export promotion strategy, designed to improve the image of regional products in export markets, develop specific campaigns for single products, and enforce the use of quality standards is required in the Region

- **Enhanced regional cooperation.**

- **Access to information:** Promote/facilitate access to information, and communication among all post-harvest stakeholders in the region through the use of both traditional and modern communication tools. Adequate sources of information in different forms (books, bulletins, leaflets, videos, slides, etc.), especially in local languages (Arabic, Urdu, Persian, Turkish) are desperately required. These should cover specific aspects of the post-harvest sector and need to be directed to specific segments of the actors of the post-harvest sector.

- **Education of women:** Special and urgent attention should be directed toward improving the knowledge and skills of women in the areas of nutrition, food preservation, simple food processing techniques, safety measures for handling/consumption of food, hygiene, etc. The active involvement and participation of women in all areas of post-harvest (education, training, and management) should be promoted.
STAKEHOLDER REPORTS

Issues Emerging From Stakeholder Reports

Workshop participants originated from a diversity of stakeholder backgrounds, representing Ministries of Agriculture, research institutes, food safety agencies, and universities. They also included extension specialists, policy makers, the private sector, and gender specialists. Major issues highlighted in stakeholder papers and presentations are summarized below.

Current Status and Trends

- Diversity of food products.
- High levels of post-harvest losses.
- Poor quality and poor handling of produce.
- Poor marketing systems, with poor integration, fragmented markets, and poor knowledge of markets.
- Increasing environmental problems and degradation of resources.
- Weak R & D infrastructure and capacity.
- Poor collaboration among institutions.

Constraints

- Low production levels, inadequate post-harvest handling and high post-harvest losses.
- Demographic growth. The region is characterized by a high population growth rate amounting to 2.5% per annum, which is higher than the world population growth rate (1.7%). This high population growth rate generates increasing food requirements.
- Conflict in the region constrains stability, investment, development and growth.
- Widening technology gap between the region and the industrial world. This is mainly due to reliance of the region on imported technology and low levels of expenditure on R & D.
- Malnutrition, poverty and poor education levels, particularly in the case of rural populations.
- Aridity and scarcity of water poses a formidable challenge to agriculture in most of the countries in the region.
- Food insecurity. The region is a food deficit region, and hence a net food importer.
- Poor knowledge base in the area of food safety: Lack of knowledge of application of Good Manufacturing Practice (GMP), Hazard Analytical Critical Control Points (HACCP), and Good Agricultural Practice (GAP).
- Lack of food safety and quality regulations. Contamination of horticultural crops by organic chemicals has become a pressing problem in many countries of the WANA region. There are no National and/or regional pesticide registration systems and national/ regional programs for monitoring contaminants in food.
- Lack of accredited laboratories, quality control, quality assurance and reliable analysis.
- Lack of understanding of the World Trade Organization agreements, i.e. Sanitary and phyto-sanitary Agreement (SPS), and Technical Barriers to Trade Agreements (TBT).
• Poor investment in facilities, R & D, etc.
• Lack of a market orientation, marketing assessments and use of cost/benefit analysis, and lack of market information.
• Fragmented land holdings in some countries.
• Lack of private sector awareness of post-harvest practices. Private sector can and will adopt advanced post-harvest practices only if they understand the economic benefits and if they are properly and practically educated.
• Relatively little coordination among post-harvest researchers.

Opportunities

• Increasing demand for higher quality produce both within the region (for higher income and more urban consumers), and in export markets.
• Proximity to markets: Many countries in the region are located at crossroads connecting East and West, as well as Europe and Africa.
• Capacity to produce a wide range of horticultural crops: The climatic conditions along with the most favourable growing conditions in the different agro-ecological zones of some countries in the region makes it ideal for producing a wide range of good quality horticultural crops.
• Access to technology packages: Availability (in countries outside of the region) of technology packages for improved production and improved handling of food.

Priorities and recommendations

• A market oriented approach for production is required. Market information is extremely important in allowing farmers and traders in making informed decisions about what to grow, when to harvest, and the market opportunities. Marketing research needs to be enhanced.
• Capacity building in food safety: Training on HACCP and GMP for the different actors in the post-harvest sector is needed. A regional monitoring program for contaminants in food, as well Regional Maximum Limits for food contaminants is required. Risk Analysis (assessment, management, communication) on food contaminants of interest in the region should also be elaborated.
• Awareness programs to increase food safety.
• Support for post-harvest R and D, including extension systems. Resources devoted to R & D should be increased.
• Investment in post-harvest infrastructure: grading, packing, storage, transport, marketing, training, research.
• Policies and regulations: Establish consumer protection laws and encourage consumer protection associations to participate actively in decisions related to food safety. Adequate policies and legislation are required for effective functioning of marketing systems.
• Gender and Equity: Female employment is needed in agriculture and in the non-farm activities, to contribute to the reduction of poverty and to improve food security.
• **Intra-regional cooperation and integration** is needed for development and economic stability in the region.

• **Harmonization of free trade agreements with WTO regulations**: Free trade agreements with Europe, Pan-Arab and bilateral agreements must be continuously assessed to ensure benefits.

• **Building up of food stocks**: Consideration should be given by countries in the region to building up food stocks (especially for cereals and wheat).

• **Improvement of trade infrastructure** and expansion of food processing and handling will contribute to food security in the region.

• **Appropriate Technologies**: Solutions to many existing problems in the post-harvest handling system require use of available information and implementation of appropriate technologies.

• **Networking at the regional level**: Establishment of a post-harvest working group in each country can be very useful in providing a forum for communication among all those concerned with post-harvest biology and technology research and extension. It will also be necessary to establish linkages among the various post-harvest working groups in the region, in order to facilitate information exchange.

**B. WORKING GROUP DELIBERATIONS**

1. **Sub-regional Strengths, Weaknesses, Opportunities, and Threats (SWOT) Analysis**

As a strategic planning tool, sub-regional SWOT analyses were conducted by grouping participants on the basis of sub-regional origin. Five working groups were constituted: Maghreb, Mashreq, Nile Valley and Red Sea, Arabian Peninsula, and West and Central Asia. Working groups were requested to identify five of the major strengths, weaknesses, opportunities and threats to development of the post-harvest sector, as a basis for developing strategies for post-harvest development within the sub-Region. This exercise allowed the participation of all stakeholders.

**The Maghreb**

**Strengths**

• *Proximity to markets*. The location of these countries facilitates easy access to important markets, particularly those in Europe.

• *Adequate land resources*. Land resources for production are adequate, despite water shortages, desertification and drought.

• *Adequate labour*. A relatively good supply of trained labour, which requires employment, is available in the Maghreb sub-region. Rural employment in both the agricultural and post-harvest sectors (rural areas) is required in order to reduce poverty and immigration to urban centres and to outside of the sub-region.
• *Adequate communication.* The geographic location of Maghreb countries on the Mediterranean Sea, allows for excellent and easy access. Roads, especially around urban cities are in reasonably good condition.

**Weaknesses**

• *Shortage of water supplies.* Shortage of water supply and droughts pose major obstacles to food production in the sub-region.

• *Lack of political will.* Despite the establishment of more than one unity agreement among the Maghreb countries (in North Africa) (the last was established since 1989), there are still serious obstacles to cooperation among these countries.

• *Lack of R and D programs.*

• *Gender inequalities.* Women in the sub-region still suffer from inequalities, especially in education and job opportunities. This is a major obstacle toward development of the sub-region.

• *Reliance on oil and foreign aid* with no will to develop promising strategies.

**Opportunities**

• *Shipping and air transport.* The proximity of the Maghreb countries to the European market, and their strategic geographic location, facilitates excellent sea and air communication, and rapid access to European ports.

• *International cooperation.* Most countries of the sub-region have established bilateral agreements with individual European countries or with the EU.

• *Export market opportunities.* The common use of European languages in the sub-region facilitates communication and contacts with export markets.

• *Historical links.* The countries of the sub-region have developed a historical common heritage and culture, which can be used very positively for development and cooperation.

**Threats**

• *Globalization.*

• *Brain drain of experts.* The immigration of many skilled individuals from the sub-region to different parts of the world, particularly Europe, leaves the sub-region disadvantaged in certain developmental sectors.

• *Nutritional and health problems,* particularly in rural areas, have a negative impact on development of the sub-region.

• *Dependence on imports (lack of food security).* The sub-region is a net importer of cereal grains. This has the net impact of placing a heavy economic burden on its economy, retarding its development, and increasing its food insecurity.

• *Lack of security and stability* and logistical/administrative problems result in low external investment.
The Nile Valley and Red Sea

**Strengths**
- **Good geographical location in relation to markets.** The sub-region has an excellent location in relation to important markets in Europe and the Gulf.
- **Climate/labour force/land/water.** The sub-region is blessed with an excellent climate for agricultural production, plenty of good productive land, plenty of good quality water (especially along the Nile Valley), and a sufficient labour force.
- **Common cultural heritage.** The countries of the sub-region have developed a historical common heritage and culture, which can be used very positively for development and cooperation.

**Weaknesses**
- **Lack of education, especially for women.** The region still suffers from a high percentage of illiteracy, especially in the rural areas, and especially among women. This problem is hindering the development of the entire sub-region.
- **Poor management practices** due to lack of information and inadequate communication.
- **Lack of strategies**, both short-term and long-term.
- **Lack of market-orientation.**
- **Fragmented agricultural lands.**
- **Lack of credit** to support post-harvest development.

**Opportunities**
- **Potential for development of inter-regional market systems.**
- **Exchange of information experience and technology.**
- **Building institutional links of research and collaboration.**
- **Enhancement of extension work.**
- **Participation in government organizations.**

**Threats**
- **Water resources and water conflict.**
- **Lack of sustainability in food production**, due to losses and inadequate policies.
- **Desertification.**

The Mashreq

**Strengths**
*Excellent location.* The sub-region has an excellent location relative to very important markets especially in Europe and the Gulf.
- **Off-season production.**
- **Wide variety of produce.**
- **Low level of illiteracy.**
- **Technology transfer in progress.**
Weaknesses
- Extension and training R and D.
- Facilities for testing.
- Gluts and lack of outlets.
- Poor quality produce and products.
- Coordination and collaboration.

Opportunities
- Relative low cost of production.
- Accessibility to EU and Gulf markets.
- High value crops.
- Regional and international agreements and conventions.
- Added value products.

Threats
- Water shortage and conflicts. Water conflicts are a major concern in the sub-region.
- Low investment.
- Un-enabling government policies.
- Regional political instability. The instability in the sub-region has a negative impact on investment in the sector.
- Small agricultural holdings.

The Arabian Peninsula

Strengths
- Available financial resources allows for high quality infrastructure.
- Efficient distribution systems which allow for joint ventures with producing countries.
- Government support for local producers.
- Predominance of private sector which is often vertically integrated.

Weaknesses
- Limited technical expertise and lack of information needed for proper handling.
- Consumer preference for imported products even if the local or regional products are of equal quality.
- Competition from imports. Availability of imported crops discourages local producers from producing these crops.
- Uneven distribution of cold storage facilities.

Opportunities
- Building local expertise in post-harvest technology and marketing via effective training programs and curricula development at universities.
- Increasing processing capabilities in order to utilize both local and imported produce beyond what can be marketed fresh.
- Developing partnerships with other countries in the region.
**External threats**
- Regional instability.
- Internal instability due to widening gaps between rich and poor.
- Water shortage.
- Fluctuations in wealth related to world oil prices.

**The West and Central Asia**

**Strengths**
- Suitable environmental conditions for growing fruits, vegetables and cereal crops.
- Large domestic market.
- Availability of labour.
- Good export potential.

**Weaknesses**
- Lack of awareness of technology.
- Lack of post-harvest infrastructure.
- Lack of legislation.
- Lack of farmer organizations.
- Access to credit.
- Lack of education, especially for women (more in Paksitan).
- Limited scientific manpower and technical expertise in post-harvest.
- Extension and training R and D.

**Opportunities**
- Target/niche markets.
- New crop production.
- Agro-based industry.
- Building local expertise in post-harvest technology and marketing via effective training programs and curricula development at universities.

**Threats**
- Unstable governments (not the case in Iran and Turkey).
- Inconsistent government policies.
- Greater trend towards urbanization.
- Natural climates.
- Small size agricultural holdings.
Table 1. The SWOT analysis of the Five sub-regions.

<table>
<thead>
<tr>
<th>Sub-Region</th>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Maghreb</td>
<td>• Proximity to market</td>
<td>• Shortage of water supplies.</td>
<td>• Shipping and air transport.</td>
<td>• Globalization.</td>
</tr>
<tr>
<td></td>
<td>• Adequate land resources</td>
<td>• Lack of political will.</td>
<td>• International cooperation.</td>
<td>• Brain drain of experts.</td>
</tr>
<tr>
<td></td>
<td>• Adequate labor</td>
<td>• Lack of R&amp;D programs.</td>
<td>• Export, market opportunities.</td>
<td>• Nutritional and health problems.</td>
</tr>
<tr>
<td></td>
<td>• Adequate communication</td>
<td>• Gender inequalities.</td>
<td>• Historical links.</td>
<td>• Dependence on imputs (lack of food security).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Reliance on oil and foreign aid.</td>
<td></td>
<td>• Lack of security and stability.</td>
</tr>
<tr>
<td>The Nile Valley and</td>
<td>• Good geographical location in relation to market.</td>
<td>• Lack of education.</td>
<td>• Potential for development of inter-regional market systems.</td>
<td>• Water resources and water conflicts.</td>
</tr>
<tr>
<td>Red Sea</td>
<td>• Climate/labour force/land/water production knows how.</td>
<td>• Poor management practices.</td>
<td>• Exchange of information experience and technology.</td>
<td>• Lack of sustainability in food production.</td>
</tr>
<tr>
<td></td>
<td>• Common cultural heritage</td>
<td>• Lack of strategies.</td>
<td>• Building institutional links of research and collaboration.</td>
<td>• Desertification.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Lack of market orientation.</td>
<td>• Enhancement of extension work.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Fragmented agricultural land.</td>
<td>• Participation in government organizations.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Lack of credit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Mashreq</td>
<td>• Excellent location.</td>
<td>• Extension and training R&amp;D.</td>
<td>• Relative low cost of production.</td>
<td>• Water shortage and conflicts.</td>
</tr>
<tr>
<td></td>
<td>• Off-season production.</td>
<td>• Facilities for testing.</td>
<td>• Accessibility to EU and Gulf markets.</td>
<td>• Low investment.</td>
</tr>
<tr>
<td></td>
<td>• Wide variety of produce.</td>
<td>• Gluts and lack of outlets.</td>
<td>• High value crops.</td>
<td>• Un-enabling government policies.</td>
</tr>
<tr>
<td></td>
<td>• Low level illiteracy.</td>
<td>• Poor quality produce and products.</td>
<td>• Regional and international agreements and conventions.</td>
<td>• Regional political instability.</td>
</tr>
<tr>
<td></td>
<td>• Technology transfer in progress.</td>
<td>• Coordination and collaboration.</td>
<td>• Added value products.</td>
<td>• Small agricultural holdings.</td>
</tr>
<tr>
<td>The Arabian Peninsula</td>
<td>• Available financial resources.</td>
<td>• Limited technical expertise.</td>
<td>• Building local expertise.</td>
<td>• Regional instability.</td>
</tr>
<tr>
<td></td>
<td>• Efficient distribution systems.</td>
<td>• Consumer preference for imported products.</td>
<td>• Increasing processing capabilities.</td>
<td>• Internal instability.</td>
</tr>
<tr>
<td></td>
<td>• Government support.</td>
<td>• Competition from imports.</td>
<td>• Developing partnership with other countries in the region.</td>
<td>• Water shortage.</td>
</tr>
<tr>
<td></td>
<td>• Predominance of private sector.</td>
<td>• Uneven distribution of cold storage facilities.</td>
<td></td>
<td>• Fluctuations in wealth related to world oil prices.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| West and Central Asia | • Suitable environment conditions for growing fruits, vegetables and cereal crops.  
• Large domestic market.  
• Availability of labour.  
• Good export potential. | • Lack of awareness of technology.  
• Lack of post-harvest technology.  
• Lack of legislation.  
• Lack of farmer organizations.  
• Access to credits.  
• Lack of education, especially for women (more in Pakistan).  
• Limited scientific manpower and technical expertise in post-harvest.  
• Extension, training, R&D. | • Target/niche markets.  
• New crop production.  
• Agro-based industry.  
• Building local expertise in post-harvest technology. | • Unstable governments.  
• Inconsistent government policies.  
• Greater trend towards urbanization.  
• Natural climates.  
• Small size agricultural holdings. |
2. Regional Strategic Priorities

A group exercise which incorporated all stakeholders present was conducted in order to identify key words for the formulation of a Goal, and Purpose for GIPh initiative in the WANA Region. This exercise led to consensus on the following:

Goal
To contribute to: improvement in the standard of living of small farmers and marketers, improved health and environmental conditions, poverty alleviation and food security in the WANA Region.

Purpose
To enhance demand-driven production, sustainability of food production and distribution, and availability and efficiency of post-harvest infrastructure through the reduction of losses, improvement of food quality and safety and through improvements in communication and information transfer in the WANA Region.

3. Sub-regional Strategies

Strategies were developed on a sub-regional basis against the background of the sub-regional reports, the stakeholder presentations, and the SWOT analyses, conducted during working group sessions.

The Maghreb

Strategies
• To develop a strategic plan for agriculture development.
• To develop an information network for post-harvest.
• To develop an intra regional centre for post-harvest.

Rationale
• Reduction of post-harvest losses as part of the means of poverty alleviation, improving health and social welfare, and environmental sustainability in the sub-region.

The Nile Valley and Red Sea

Strategies
• To develop a production map for the region.
• To encourage market-oriented production and effective integrated crop management and GAP.
• To apply proper harvest and post-harvest technologies
• To improve the infrastructure of post-harvest handling systems including packaging, transportation, processing and implementation of the cold-chain concept.
• Coordination among Ministries of Agriculture and Agricultural Research Centres in all countries in the sub-region to develop effective policies for production and post-harvest handling.
• Improve technical education related to post-harvest and development of effective extension and outreach programs.
• Encourage sub-regional unity among growers, producers and exporters.

Rationale
• Encourage the development of a common market within the sub-region.

The Mashreq

Strategies
1. Improve know-how in post-harvest.
2. Activate and strengthen the regulations which govern marketing and trade.
3. Improve technology transfer.
4. Increase farmer, exporter, and consumer awareness.

Rationale
To reduce economic losses caused by high post-harvest losses within the production and the post-harvest sector.

The Arabian Peninsula

Strategies
• To improve technical capabilities and enhance policies in support of post-harvest distribution systems.
• To improve networking and information capabilities, and efficiency in the use of facilities and infrastructure.
• To increase consumer awareness of proper produce handling conditions.

Rationale
• To reduce post-harvest losses through building local technical capacity.

The West and Central Asia

Strategies
• To invite grower organizations from developed countries to establish post-harvest infrastructure (this system is already established in Iran).
• Establish adequate government policies to develop post-harvest infrastructure.
• Strengthen the information technology.
• Reinforce common strategies.
Employ proper harvest and post-harvest technologies during all the handling systems.

Rationale
• To reduce the losses from growers to the consumers. This can be achieved by increasing the awareness by training programs and by establishing infrastructure.

4. Thematic Discussions

Workshop participants prioritized a number of thematic areas for inclusion in the post-harvest initiative, based on a synthesis of the information contained in the sub-regional reports, stakeholder papers, the SWOT analysis and the emerging sub-regional strategies. These thematic areas also support the goal and purpose of the overall initiative.

The theme areas identified (not in order of priority) were:
• Information and networking.
• Infrastructure.
• Research, education, training.
• Marketing.
• Quality standards & policy legislation.

Five Working groups were established in order to further deliberate on each of the thematic areas, and to identify objectives and activities needed to achieve them.

Information and networking

Objectives
• To provide easy access to reliable post-harvest technology and marketing information.
• To encourage private sector support of research and development efforts.
• To create national and regional post-harvest networks in order to facilitate cooperation and coordination of joint programs in R & D.
• To develop information pertinent to investment returns for post-harvest technologies.

Activities
I. 
  a. Promote the Inpho website and translate into Arabic, Urdu, Turkish, and Persian of the most relevant sections of the website.
  b. Encourage post-harvest groups in each country to present the most reliable, relevant information. These national websites can be linked to the Inpho website.
  c. Use information dissemination methods other than the Internet to make reliable and relevant information available to all clientele groups, taking into consideration their
communication capabilities. Radio and TV programs are likely to reach the largest percentage of the population.

II.
a. Recommend that international aid providers involve stakeholders in funding each project gradually to assure continuity beyond the end of the aid provided.
b. Encourage shared funding of all R & D efforts, between the private sector and government agencies
c. Streamline the administrative process to facilitate implementation of collaborative R & D efforts.

III.
a. Formation of an effective national network among post-harvest research and extension workers should be a prerequisite to the provision of FAO funding for post-harvest development.
b. Involve AARINENA in formulating a regional network among post-harvest research and extension workers and facilitate communication, collaboration, and other interactions. This effort may include:
   1. Establishing and maintaining a website and a listserv for communication among network members.
   2. Developing and publishing a directory of all post-harvest research and extension workers in the region.
   3. Sponsoring periodic meetings within each sub-region or within the whole region.

IV.
a. Support a regional research and extension project to identify appropriate post-harvest technologies for maintaining quality and safety of produce, and to estimate the cost/benefit (return on investment) of each of the identified Technologies. Results of this research should be disseminated widely to all potential users in the region.

Infrastructure

Objectives

1. To improve transportation.
2. To improve access to cooling facilities. Introduce low cost on-farm storage structures.
3. Construction/improvement of pack houses
5. To upgrade packaging.
6. To develop training programs.
7. To develop research facilities.
8. To facilitate networking and information exchange in the region.
9. To develop road and railway infrastructure.
Activities

1. Development of refrigerated trucks.
2. Construction of new roads and railways.
3. Building of non-conventional storage facilities (evaporative cooling, water cooling).
4. Replacing outdated equipment.
5. Improving communication between markets.

Recommendations for infrastructural development

1. Identifying what facilities are available in the region.
2. Maintain and optimize the use of existing facilities.
3. Identify potential areas for improving available infrastructure and facilities.
4. Identify low cost appropriate technologies that can be relatively easily maintained.

Research, education, training

Education

Objectives
1. To increase consumer awareness, through education at the school level, and via the mass media.

Activities
1. Launching of national programs through brochures, TV, radio, newspapers, exhibitions, and courses.
2. Organizing ad hoc courses at the University level.
3. Introducing specialized degrees at the graduate level (teaching teachers).
4. Promoting awareness of post-harvest and food safety through education.

Research

Objectives
1. Should reflect local needs.
2. Should be cooperative in the region.
3. Should provide practical solutions to post-harvest problems.
4. Should provide methodologies for the region (adaptability).
5. Should provide quality parameters for the region.

Activities
1. Carry out research in consultation with local producers, market operators and consumers (new variety trials, competitive preservation methods, adaptability of quality standards).
2. Improve communication at national and regional level (exchange of results).
3. Establish national and regional networks.

Training

Objectives

1. Training for producers, quality inspectors, market operators, extension agents.
2. Continuous on-job training.

Activities

1. Organize workshops and short courses for various target groups (extension specialists, farmers, market operators)
2. Organize field training for farmers.
3. Publish training manuals (brochures, slides, visual and audiovisual aids), especially in local languages.

Extension

Objectives

1. Establish and or improve a well-structured extension system and network and extension centres to provide post-harvest information and well-trained post-harvest specialists.
2. Emphasize a participatory approach so that farmers and marketers become part of the decision making process.
3. Encourage private sector extension services in parallel with government efforts.
4. Enhance grouping of small growers and marketers to receive good extension services.
5. Conduct a follow-up workshop on post-harvest research extension (SDRE and AGSI).

Activities

1. Post-harvest biology and technology short courses for extension agencies.
2. Equip the extension post-harvest centres with facilities and information (written and electronic form).
3. Field days and visits to modern post-harvest facilities in the region.
4. Encourage the mass media to disseminate the extension information.

Marketing

Objectives

1. Establish marketing information systems for qualitative and quantitative information at national and regional level.
3. Identify high priority products.
4. Intra/extra trade promotion for WANA products.
Activities
1. Assess current availability of marketing information.
2. Design efficient marketing systems at the national level.
3. Link WANA databases into a regional network.
4. Develop a marketing information website for the WANA region.
5. Design an information dissemination system.
6. Establish national and regional marketing intelligence systems.
7. Provide specialized training on marketing research.
8. Facilitate information exchange among WANA countries.
9. Encourage establishment/enforcement of quality standards and grades.
10. Design and implement marketing extension programs.
11. Quantify post-harvest losses and present information to policy makers.
12. Encourage producers and exporters organizations.
13. Study market windows and potential markets.
14. Conduct socio-economic and marketing studies to determine comparative advantage and high value added crops that would be produced in the region.
15. Registering local typical products and techniques within the concept of TRIPS.
16. Promote organic and IPM production systems.
17. Promote innovative fresh and processed products, e.g. natural flavoured products.
18. Allocate funds for participation in trade fairs and campaigns.
19. Publicity media campaigns.
20. Establishing and strengthening linkages among WANA exporters and importers in foreign markets.

Quality standards and policy legislation

Objectives
1. Priorities to improve quality and safety of food products.

Activities
2. Implementation of the legislation and standards for handling, grading, sorting, etc.
3. Harmonization of standards among members of the WANA region.
4. Priority setting in each C-WANA for contaminants and commodities.
5. Ensuring that standards of imported products for the WANA region members are equivalent to those in the producing countries.
6. Orient governmental funds (incentives, field trips, scientific visits, etc) to support research and development for the post-harvest sector.
7. Government, private sector, and NGOs should be encouraged to launch and enhance nutritional programs on post-harvest research and development.
8. Risk analysis should be adopted for specific food contaminants in C-WANA.
9. C-WANA should set up a regional agricultural information system for networking, communication, dissemination and exchange of information as a case for improving food quality and safety.
10. Governments need to review existing legislation and policy programs, in order to identify gaps and update them to conform to WTO rules and procedures.

11. A bottom up approach that incorporates all concerned parties (ministries, food industries, research institutes, universities, NGOs, farmers’ organizations, etc) should be used to accept the above activity and meet consumer requirements.

12. Updated legislation and standards can be facilitated by the technical and financial support of international organizations.

13. International agencies could play a role in defining priorities, formulating policies, and harmonizing legislation and standards in C-WANA.

14. AARINENA would facilitate networking activities among C-WANA.

15. Establishment/improvement of quality control centres to fulfil required analysis on food products for local and external markets.

5. Cross-cutting Issues

- **Increased public awareness of the post-harvest sector.** Post-harvest is of interest to very few producers and exporters in countries of the region (such as Egypt, Morocco and Jordan). An intensive campaign is required in order to increase awareness of the importance of post-harvest among producers, distributors (in local and export markets), and consumers.

- **Increased competitiveness and sustainability within the post-harvest sector.**

- **Gender/ and Equity.** Illiteracy among women, and the inequality of women in most of the countries of the region are still the cause of major obstacles toward the economic and social development of the region.

- **Networking, communication, information.** Networking, communication and access to information are basic elements for development which are deficient in the WANA region. Website development can provide an excellent tool for communication and dissemination of information in the region, and would greatly facilitate communication among stakeholders of the sector. A considerable amount of information on post-harvest biology, physiology, technology and handling of food is available through many public sources (such as books, journals, web pages, etc). This information should be made available and used to solve some of the problems of food handling in the region.

- **Environmental considerations.** Environmental considerations have not been a priority in most of the countries of the WANA region. There is significant environmental degradation that should be dealt with urgently.

- **Maintenance and follow-up.** Maintenance of infrastructure and facilities in almost all countries of the region is very poor, causing major post-harvest losses. Efforts should be made to create a tradition of maintenance through adequately training personnel, better planning and designing of infrastructure and facilities, availability of spare parts, improved efficiency and better handling of resources.

- **Use of local capacity in post-harvest development in the region.** Excellent local resources (researchers, educators, trained personnel, some infrastructures, facilities) are available in the region. These resources are, however, not efficiently used, and in many cases have not even been identified. Some of the human resources have immigrated looking for an adequate work environment. Efforts MUST be made to identify these local resources, to prepare a directory, which should be made available in the region.
Capacity building and demand-driven applied research.

Nutrition/health safety measures. Poor nutrition in most countries of the region including the wealthier countries, leads to poor health, and is still a major obstacle toward development of the population of the region. Food safety in the region is poor and almost lacking in some countries or locations. Efforts should be intensified to improve the knowledge base and practices on nutrition, health and food safety.

Marketing/improvement of distribution chains/centres. Marketing/marketing centres/distribution centres are very poor in almost all countries of the region, and urgently require improvement.

Enhancing the involvement of the private sector, NGOs. Poor private sector participation in most countries in the region, negatively impacts on development of the sector.

Biotechnology and its implications. Biotechnology offers potential solutions to some of the problems which face food production in the region. Greater efforts are therefore required in order to establish adequate facilities and infrastructure and trained personnel, to formulate adequate policies for the use of biotechnology, in order to dispel some of the myths surrounding biotechnology.

Development/implementation of quality standards. The quality of fresh produce and products produced in the region is still poor. Quality standards are either not developed and/or not implemented. Serious efforts are required in order to develop standards, and to implement them adequately for products intended for export as well as for the domestic market.

Improved distribution systems. Distribution systems are very poor in almost all countries of the region and require improvement.

Trade policies. Official trade policies in member countries of the WANA region are deficient, lack clear objectives, and need to be revised and improved.

C. Conclusions and Recommendations

A group exercise which incorporated all stakeholders present was conducted in order to formulate major conclusions and recommendations to the Workshop. Using this participatory approach, stakeholders were of the opinion that:

The post-harvest sector in the region is extremely weak, and requires considerable improvement.

There is an urgent need for a follow-up workshop on post-harvest extension.

There are urgent needs for establishment of control information systems.

There is a need for the development of efficiency indicators for post-harvest.

Promotion of investment in post-harvest development is important and very relevant.

Access to information in the region needs to be promoted and liberated.

It is necessary to plan and announce guidelines for post-harvest controls through official channels responsible for following up, implementation, as well as for developing techniques and providing expertise to different levels.
A follow-up to this study and the workshop is critically important for the improvement of the post-harvest sector, and to increase the availability and safety of food in the WANA region.