

Australia – Pakistan

Agriculture Sector Linkages Program

Annual Report 2005-2006
&
Annual Operational Plan 2006-2007

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1. Executive Summary

The first half of FY 05-06 was spent consulting with partners in Pakistan to achieve agreement on the focus and the priorities of the ASLP. This formed the basis for the development of an implementation plan, which was signed off in November 2005. The remainder of FY 05-06 was spent gearing up to implement the activities planned for this FY, and a program support officer was appointed in February 2006 to support to the ASLP implementation in country. Good progress has been made on all activities planned for FY 05-06.

The first major activity was the technical workshop on mangoes held in Multan in March, with participation of 36 delegates from a broad cross-section of the Pakistan mango sector and 13 mango specialists from Australia. The workshop achieved its objectives and was the first such workshop bringing together Pakistan mango scientists and extensionists with the private sector and mango marketers in one forum. It received a high media profile and was a very useful forum in which to obtain a broader endorsement of key training and R&D needs.

In April, an Australian team comprising 6 mango horticulturists visited key mango growing areas in the Provinces of Punjab and Sindh to survey a cross-section of mango farms to establish key mango disease and production constraints. Mango Sudden Decline Syndrome (MSDS) was confirmed as the main disease of concern in nearly all orchards surveyed, and the probable pathogen identified. The need for an integrated orchard management approach was also recognised, and will form the basis for designing the follow-on training and R&D project.

A mango supply chain constraints analysis was carried out early April by a team comprising supply chain management, marketing, postharvest and industry development experts. The study concluded that enhancing mango competitiveness will involve the improvement of four sub-systems that determine supply chain performance: (i) product quality, (ii) value creation and appropriation, (iii) information, and (iv) governance. Improving product quality and reducing losses is the highest priority need, requiring a multi-faceted strategy spanning pre-harvest and postharvest practices, training, R&D, and demonstrations. This focus and approach will be taken up by the follow-on project.

A dairy constraints analysis team travelled to Pakistan during May. The team consisted of dairy systems, animal health, forage and animal nutrition, dairy market and policy experts. The team was joined by an agribusiness expert from Austrade to facilitate linkages between the ACIAR and Austrade dairy components of the ASLP. The team was able to obtain the information necessary to compile a reasonably detailed picture of the Pakistan dairy sector, its key drivers and possible constraints, allowing for a number of critical conclusions and recommendations to be drawn and the development of dairy R&D activities to be planned. The focus of the envisaged follow-on training and R&D activities will be on an integrated approach to compile, appropriately synthesise and disseminate already available information, supplemented by targeted adaptive on-farm research, working closely with NGOs and small-holder communities.

The main emphasis in the beginning of FY 06-07 will be to finalise the project design for the planned R, D&E projects. Based on recommendations out of the mango workshop and the scoping studies it is proposed to cluster the training and R&D activities in each of the ASLP components into four integrated projects: (i) Mango production, (ii) Mango supply chain development, (iii) Citrus production and (iv) Dairy productivity. Once these projects have been implemented, the focus in the remainder of FY 06-07 will shift to monitoring project progress, supplemented by a number of exposure visits by Pakistan groups to Australia as per ASLP plan.

2. Review of Progress FY 05-06

2.1 Overview

The first half of FY 05-06 was spent consulting with partners in Pakistan to achieve agreement on the focus and the priorities of the ASLP. A first ACIAR mission comprising Dr Christian Roth (ASLP Coordinator; Research Program Manager for Soil Management and Crop Nutrition), Dr Bill Winter (Research Program Manager Livestock Production Systems), Mr Allan Barden (Manager, International Program Support) and Dr Kuhu Chatterjee (Country Manager South Asia) visited Pakistan in August 2005, establishing an aide-memoire outlining the general ASLP modalities and priorities. This formed the basis for the development of an implementation plan, which was approved by AusAID and signed off by MINFAL during the visit to Pakistan in November 2005 by Prime Minister John Howard. During these two development stages, the ASLP also consulted a broad range of potential Australian research providers on their capabilities and interest in becoming involved in the ASLP.

Following the formal sign-off on the ASLP Plan, the remainder of FY 05-06 was spent gearing up to implement the activities planned for this FY, as well as starting the planning for the envisaged training and R&D activities in the out-years. Progress has been made as planned on all activities planned this FY, although there has been some degree of slippage on some activities (B.1.1, B.1.2, C.1.5). Details on the progress achieved against each activity are provided in the following sections.

A program support officer – Mr Sosheel Godfrey Solomon - was appointed in February 2006 to support to the ASLP implementation in country. A very energetic and competent officer, he has been instrumental in enabling us to successfully synchronise the mango activities at fairly short notice, and is providing continued invaluable support in liaising on a routine base with key stakeholders in Pakistan in preparation of the other ongoing or planned activities.

2.2 Program Activities

Horticulture – mangos

A.1.1 Short term consultancy to rapidly diagnose mango dieback and malformation

A team comprising 5 mango specialists (pathologists, agronomists, entomologists) from Queensland Department of Primary Industries and Fisheries (QDPI&F) and an Australian mango grower and representative of the Australian Mango Industry Association visited key mango growing areas in the Provinces of Punjab (Multan area) and Sindh (Hyderabad area) to survey a cross-section of mango farms. Prior to this, the team's visit coincided with the mango workshop visit (see A.1.2). The terms of reference of the mission were expanded to include an assessment of general constraints to mango production. In close co-operation with Pakistan counterparts, the team reviewed research, development and extension activities in the Pakistan mango industry to identify R & D issues that could be addressed through subsequent activities funded under ASLP, particularly focussing on causes and control of mango sudden death syndrome (MSDS). Key elements of the study were:

- Documentation of the current industry status and available information
- A 4 day workshop for 13 Australians and 36 Pakistan participants
- 8 days of field surveys and visits to R&D agencies in the main mango production regions of Punjab and Sindh provinces by the Australian study team and Pakistan collaborators
- Detailed assessment of the background information, workshop and survey findings to develop recommendations for future R & D needs.

During the survey visits that followed the workshop, there were interactions between growers, researchers and other industry stakeholders, and the problems and issues facing mango production and quality in Pakistan were examined and discussed. Disease symptomatic samples as well as soil and leaf samples were collected for laboratory analysis.

MSDS was confirmed the main production issue of concern in just about every orchard that was visited averaging 3.2 trees per 10 tree sample in Punjab and 6 trees per sample in Sindh. The key issues of concern with MSDS were early identification and procedures to stop or slow its progress in orchards. A number of pathogens have been identified from field samples including *Cerotasytis* sp and *Laisodiplodia* sp. Insect pests were mainly classified as a minor issue. Other issues identified during the visits were problems of orchard management related to nutrition, irrigation, water quality and ways of synchronizing tree phenology.

Detailed assessment of the background information, workshop and survey findings has identified the following key areas to be addressed through the prospective follow-on ASLP project:

1. Develop improved detection and management strategies for mango sudden death syndrome disease and other critical pests of mangoes
2. Develop improved tree husbandry options for the establishment of suitable clean and disease-free mango orchards
3. Build research and extension capacity in the Pakistan mango industry so that they can undertake participatory on-farm research using a systems approach.

The study thus also recommended that the three ASLP activities A.1.3 (capacity building/training modules), A.1.4 (Disease management) and A.1.5 (Orchard management) needed to be combined into an integrated project rather than developed as stand-alone activities. A report documenting the above in more detail was received by ACIAR on the 22 May and following review by ACIAR has been circulated to stakeholders in Pakistan.

A.1.2 Technical workshop on mango diseases, tree/orchard agronomy, and irrigation and drainage management

The technical workshop on mangoes was held 28-31 March 2006 in Multan. Contrary to the original plan, its scope was broadened to cover all aspects of the Pakistan mango sector. The workshop objectives were:

1. To bring together researchers and stakeholders from Pakistan and Australia working in mango research, extension and agri-business, in order to build linkages by sharing and jointly evaluating results and experiences in mango research and extension;
2. To clarify future mango research and development needs in partnership with relevant agencies for collaborative activities under the auspices of the ASLP
3. To identify future capacity building and training needs in Pakistan mango research, development and extension.

Cost savings by synchronising the workshop with the two Australian mango scoping study teams (A.1.1; A.2.1) allowed the broader participation of the Pakistan mango sector (36 in total), with representatives from relevant Federal, Punjab and Sindh government departments; key federal, provincial and university mango research groups, mango growers, and the Pakistan Horticulture Development and Export Board. The Australian participants (13) included mango researchers from the Queensland Dept. of Primary Industries & Fisheries (QDPI&F) and Dept. of Agriculture Western Australia (DAWA), supply chain and agribusiness development experts from the University of Queensland (UQ), as well as the relevant ACIAR research program managers.

Overall, the workshop achieved all of its objectives and was generally very well received. Indeed, it was the first such workshop bringing together Pakistan mango scientists and extensionists with the private sector and the mango marketers in one forum. As the workshop was formally inaugurated by the Federal Minister for Agriculture, it also received a high media profile and internet exposure (e.g. <http://www.phdeb.org/topstoriesEvents/ASLP/index.php>). Most importantly, it was a very useful forum in which to obtain a broader endorsement of key training and R&D needs, which were captured in the following key workshop recommendations:

Recommendation 1: Development of two ASLP research & development projects:

Project 1 - Goal: to produce better quality mangoes for the domestic and export markets

Project 2 - Goal: to deliver better quality mangoes to consumers in Pakistan and selected overseas markets

Recommendation 2: Design and delivery of a training and capacity building programme

- Training and capacity building in mangoes by the ASLP will be undertaken in a project context
- Training modules will be tailored to match needs of different target groups (researchers, extensionists, farmers, contractors, processors, marketers)
- Underpinning tailored training modules will be a programme of more broader enhancement of farmer and extensionist skills using approaches like Farmer Field Schools

Recommendation 3: Enhancing linkages beyond the ASLP

- Enhanced coordination by Pakistan Agricultural Research Council (PARC) of research linkages with the two ASLP projects by calling for complimentary proposals through the Agriculture Linkages Program
- Flanking infrastructure development (e.g. cool chains; cooled transport) needs to be pursued as a matter of urgency through PHDEB, MINFAL/ADB project and Provincial Govt. initiatives
- Upscaling of training by linkage with other GoP and Provincial Govt. programmes and the AusAID training and scholarship programme

A.2.1 Short term scoping studies and mango supply chain analysis

This initial short term scoping study and constraints analysis was carried out from 25 March to 9 April 2006, in conjunction with the disease diagnosis study (A.1.1) and the mango workshop (A.1.2). The scoping study team comprised 2 supply chain management/marketing specialists from UQ, 2 post harvest experts (one of them an Australian trained researcher from the University of Agriculture Faisalabad, UAF) and product quality/industry development expert from DAWA. The team provided a comprehensive report in early May which following review by ACIAR has been circulated to stakeholders in Pakistan. The key findings and recommendations are as follows.

Improvement of competitiveness will involve the improvement of four sub-systems that determine supply chain performance: (i) product quality, (ii) value creation and appropriation, (iii) information, and (iv) governance. Improving product quality and reducing losses is the highest priority need, requiring a multi-faceted strategy spanning pre-harvest and postharvest practices, training, R&D, and demonstrations. Value creation and appropriation is characterised by low overall levels of value, distributed asymmetrically. Improvements in quality will drive improvements in value. Information systems must be improved so that they become the vehicle for messages about improving product quality, the needs of other chain members and feedback

from markets. Overarching these improvements is the need for integrated supply chain governance. Governance will focus on issues such as rules of operation, efficiency and equity in chain performance, and the chain's ability to respond to changing circumstances.

Four possible R&D approaches have been identified. They are training, research, demonstrations and capacity building. Each can be applied at the industry-wide level, at the level of specific operators in the supply chain such as growers, transport operators, contractors, etc., or at the level of a specific supply chain. Not all approaches can be used at all levels. Training will be targeted at specific chains and levels in chains; research will focus on industry-wide problems; demonstration activities will be oriented towards specific chains; and capacity building will be at the industry-wide and specific chain levels.

Three sub-projects emerge from this scoping study. They are:

1. Mango quality improvement and maintenance
2. Market research (domestic and export)
3. Developing demonstration supply chains (domestic and export).

Sub-project 1 will be informed by the outcomes of A.1.1, which is focused on mango orchard, pest and disease management. Sub-projects 1 and 2 will feed into sub-project 3, which will provide examples of how the four supply chain sub-systems (see above) can be integrated so as to produce mangoes of improved quality, generate improved market returns for this quality, distribute that value equitably, gather and feed back information that encourages continuation of improved practices, and govern the supply chain as a single competitive unit. Participants for these demonstration supply chains have been identified during this scoping study.

A study of institutional frameworks has become the subject of a separate sub-project. In brief, the mango industry in Pakistan operates in a largely unregulated environment. The country's Rapid Export Growth Strategy could provide considerable impetus to developing the mango industry. The main supporting agency for the mango industry is the Pakistan Horticulture Development and Export Board (PHDEB), which is doing an excellent job. Opportunities exist to strengthen institutions such as the University of Agriculture Faisalabad.

Horticulture - citrus

B.1.1 Short term visits by Australian citrus experts to Pakistan

A team visited Pakistan 15-26 July 2006. Originally, this activity was due to take place in March 2006, but had to be deferred upon request by MINFAL to defer the citrus workshop into July. The team comprised a cross-section of the Australian citrus R&D and industry sector, including a citrus pathologist (University of Western Sydney), an agronomist (QDPI&F), an irrigation specialist (NSW DPI), a post harvest specialist (consultant), a grower and an industry representative (Citrus Board of SA) and the relevant ACIAR Program Manager.

B.1.2 Technical workshop on citrus diseases, tree/orchard agronomy and irrigation and drainage management

As indicated above, the date of the workshop had to be deferred upon request by MINFAL. It now took place in Islamabad during the 23-25 July 2006, concurrent to activity B.1.1. A local organising committee chaired by PARC is developed a detailed workshop programme in liaison with the ACIAR Research Program Manager for Horticulture, Mr Les Baxter. It was modelled along the lines of the successful mango workshop and involved a cross-section of the Pakistan (Punjab and North West Frontier Province, NWFP) and Australian citrus sectors.

B.1.4 Citrus sector exposure visit by Pakistan technical experts and agribusiness entrepreneurs to Australia

A group of Pakistan technical experts and industry representatives comprising 3 Govt. officials (MINFAL; Pakistan Horticulture Development & Export Board; Punjab Dept. Agri-marketing), 4 citrus growers, 2 citrus processors and 1 citrus post harvest specialist visited the Australian citrus industry 10-19 May 2006. The visit was publicised in Pakistan by the PHDEB (http://www.phdeb.org/topstoriesEvents/events_detail.php?id=1863). The itinerary included visits to key research institutions in Queensland, NSW and South Australia, as well as providing exposure to commercial citrus farms, industry organisations, processing and marketing. The visit was organised and hosted by QDPI&F, concluding with a one-day workshop at the end of the tour.

The visit was very well received by the Pakistan delegation. Key observations and recommendations arising out of the wrap-up workshop include:

- Compared to Australia, in Pakistan linkages between researchers and growers are virtually non-existent, and there is also a lack of research coordination between research institutes. The ASLP offers an opportunity to form some of these linkages within Pakistan, as well as between Pakistan and Australia.
- Tree management in Pakistan is poor even in basics such as pruning, irrigation and pest management. For instance, Pakistan growers do not have any crop management protocols for irrigation, fertilisation, and the use of plant growth regulators. However, Australian growers follow strict protocols for export markets. Developing such protocols for Pakistan could be one option within the planned R&D activity B.1.5.
- Pakistan only exports fruit to countries with low or no demands on quality compliance, such as Russia, Egypt and the Middle East. Pakistan loses 30-35% of the crop due to poor quality standards, lack of storage facilities and poor crop management.
- Public and private partnerships should be emphasised in any future ASLP project rather than projects concentrating only on government research institutes. The project should have grower focussed research. A grower from NWFP (Mardan and other regions) emphasised that a portion of the project should also be spent in NWFP, as traditionally too many resources flow to the Punjab and not enough to other provinces.
- The Pakistanis were very interested to learn how the Australian citrus industry is structured. In particular, the group was interested in grower co-operatives such as the one visited in Gayndah (GayPak), and would like the ASLP provide some assistance in forming similar ventures in Pakistan.

It is anticipated that further follow-up activities, including additional, more targeted exchange and training visits will be required. These will be integrated into the planned follow-on activities B.1.3 and B.1.5.

Livestock - dairy

C.1.1 Scoping study and constraints analysis to identify critical R,D & E investment priorities in dairy production

A dairy scoping team was assembled in January this year, but due to prior commitments of key team members and the team leader, it was only possible for the mission to travel to Pakistan during 8-20 May, two months later planned. A final report was recently submitted to ACIAR and is currently under review. The team consisted of a dairy systems specialist (DPI Victoria), and animal health expert (University Sydney), two forage and animal nutrition specialist (QDPI&F) and a dairy market and policy expert (consultant). An Austrade expert (Robert Sutton; Manager

Agribusiness and Consumer) joined the mission in order to facilitate linkages between the ACIAR and Austrade dairy components of the ASLP.

Based on a preliminary report, the team was able to obtain the information necessary to compile a reasonably detailed picture of the Pakistan dairy sector, its key drivers and possible constraints, allowing for a number of critical conclusions and recommendations to be drawn:

- The milk sector is far more complex than initially anticipated. Only 3% of the milk is processed and bottled. The remainder is delivered through more or less informal market channels. In rural areas, middlemen represent a critical component in collecting and marketing smallholder produced milk. In large cities, large milk animal colonies located in the peri-urban belts and based on outside fodder and concentrates provide the mainstay of milk production. These colonies present significant environmental, human health and animal welfare problems, and would not be the primary target group of the ASLP.
- The demand for lactating animals in the peri-urban dairy colonies is a key driver for rural producers to hold larger animal numbers than their feed base allows, as sale of lactating animals is a significant additional income on top of milk production. This in turn affects low unit animal milk productivity.
- Lack of consistent milk supply (quantity, quality) for some of the above reasons is a major constraint to increasing the proportion of processed milk. Due to lack of supply, of 8 milk plants in Sindh, only one is operational.
- As in the horticulture sector, the knowledge base in research institutions is quite good, but there is a significant disconnect between researchers and end-users. Moreover, the knowledge base is very fragmented due to the disciplinary structure and poor research coordination or collaboration between research institutions. The extension service is ineffective, and knowledge is not accessible or assembled in user-friendly ways.
- There seem to be two major opportunities for the ASLP to progress here. The scoping study has confirmed the need to work closely with NGOs such as the National Rural Support Service (NRSP) to target small-holder communities, including the middlemen. The focus of the envisaged follow-on training and R&D activities should be an integrated approach to compile, appropriately synthesise and disseminate already available information, supplemented by targeted adaptive on-farm research. The scoping team strongly recommends the clustering of activities C.1.2, C.1.3 and C.1.6 into one consolidated project to maximise synergies and efficiency of delivery.
- The second opportunity relates to conducting policy linkages research, to provide advice on whether the policies in the dairy sector and the institutional arrangements are conducive to fostering greater and more efficient market development as well as increased private sector engagement, or how these policies could be modified.

C.1.5 Sourcing and transfer of animal germplasm (Australian Friesian Sahiwal) and drought and salt-tolerant forage germplasm from Australia to Pakistan

Progress against this activity has been slower than planned. One reason is that the original Australian-Friesian-Sahiwal (AFS) breeding herd, which was the primary source solicited by MINFAL for germplasm transfer, has been disbanded and sold off into the private sector, making the sourcing of animal germplasm more complex. Another problem encountered was the lack of a continuous interface within MINFAL and PARC due to staff turnover. However, delegates for a Pakistan mission to Australia in August to select animal germplasm have been nominated and the planning of their itinerary and contacts with Australian dairy breeders is underway. Liaison with Austrade is being maintained in this activity.

3. Annual Operational Plan FY 06-07

3.1 Overview

The main emphasis in the coming months will be to finalise the project design for the planned R, D&E projects. As outlined in the previous sections, both the Australian and Pakistan partners have recommended the clustering of the training and R&D activities in each of the ASLP components:

- Mango production: A.1.3+A.1.4+A.1.5
- Mango supply chain development: A.2.3+A.2.4
- Citrus production: B.1.3+B.1.5
- Dairy productivity: C.1.2+C.1.3+C.1.6

Implementation of the projects depends on the time required to obtain approval by the relevant Pakistan government departments. Recent ACIAR experience has been that project approval through EAD can be achieved in 3-4 months; this requires extensive briefing of government departments involved in the EAD sign-off process, which will be carried out by the ASLP coordinator during the next trip to Pakistan in August, with support from the ASLP program officer based in Islamabad, and the Pakistan project leaders. Nonetheless, given the size and complexity of the projects and a multitude of competing interests in Pakistan, there is a possibility that delays in sign-off and, hence, implementation might occur. However, due to the high profile of the ASLP and the continued high level of ministerial support we are confident that all projects should be implemented early in 2007. This does however represent slippage by some projects of about 3-6 months.

Once the four projects have been implemented, the focus in the remainder of FY 06-07 will shift to monitoring project progress, supplemented by a number of exposure visits by Pakistan groups to Australia as per ASLP plan. Details on the activities in each project are provided below.

3.2 Program Activities

Horticulture – mangos

A.1.3 Development and delivery of training modules on participatory research and extension methodologies in mango production

A.1.4 R & D project to develop and implement mango disease management strategies and certified nursery programs

A.1.5 R & D project to improve mango production through improved orchard and water management

Activities to progress this cluster are well underway. Building on the outcomes of the workshop and the disease constraints analysis, a final version of the project proposal has been developed in close consultation with the Pakistan partners. This proposal has been formally submitted to ACIAR in time for the August in-house review. If approved by ACIAR's Board of Management early September, the proposal could be finalised and sent to Pakistan for approval by mid September. The institutions formally involved in this project include QDPI&F (Commissioned Organisation), Northern Territory Dept. of Primary Industry, Fisheries and Mines from Australia and, within Pakistan, the Institute of Plant and Environmental Protection, NARC (Pakistan lead agency), National Integrated Pest Management Programme, Mango Research Station at Shujabad, Agriculture Research Sindh and the Depts. of Agricultural Extension Punjab and Sindh. The main objectives and anticipated outputs of the project are:

1. To facilitate the establishment of mango nurseries free of specific diseases so that high quality planting material is widely available to the Pakistan industry.

Rationale:

Poor orchard establishment is a major issue in new plantings with the introduction of diseased material into new orchards. This is a critical objective that would ensure long term solutions to the problem and minimise the introduction of diseased planting materials into these new plantings,

Activities:

- 1.1 Establish, in conjunction with the research stations and/or a commercial nursery operator, a model mango nursery for growers, free of bacterial black spot and other major diseases such as sudden death and malformation.
- 1.2 Develop a nursery production manual to train others in establishing commercial and disease-free nurseries.

2. To develop improved tree husbandry and management options to produce sustainable yields and quality fruit.

Rationale:

There are several mango cultivars currently being grown across the different production districts of Pakistan. Most of these cultivars have been derived from mono-embryonic desi-type (local) rootstocks which are susceptible to a number of physiological stresses such as high soil pH and salinity, and to different pests and diseases. There is an urgent need to source and introduce poly-embryonic rootstocks that have resistance or tolerance to these stresses, and to develop appropriate management practices for their sustainable growth.

Activities:

- 2.1 Identify, acquire and import into Pakistan salt and high pH resistant poly-embryonic rootstocks for incorporation into the Pakistan mango development program.
- 2.2 Develop and evaluate plant nutrients and canopy management strategies for different mango production districts of Pakistan and Australia.
- 2.3 Establishment of demonstration blocks demonstrating new rootstocks, plant nutrition and irrigation strategies and modified canopy management.

3. To develop improved detection and management strategies for mango sudden death syndrome (MSDS) and other major diseases and pests of mangoes.

Rationale:

From the recent SRA workshop and visits as part of HORT/2005/154, it was clear that to make a significant contribution to the production of quality mangoes for export in Pakistan, MSDS will have to be addressed. Key strategies on the early detection and management of the disease have to be established and provided to the growers. Dendritic spot is an emerging postharvest disease in Australia that little is known about and there is also need for new postharvest fruit treatments.

Activities:

- 3.1 Develop and evaluate standardized lab and field methods for detecting the causal agents of MSDS in Pakistan, and dendritic spots on fruits in Australia.
- 3.2 Develop and evaluate improved field management strategies for MSDS in the main mango production districts of Pakistan.
- 3.3 Undertake a study on the epidemiology of MSDS in Pakistan and dendritic spots in Australia. This will include among other things, an understanding of inoculum sources as well as methods of disease development, transmission and spread.

3.4 Investigate options for the replacement of current postharvest fruit treatments of mangoes in Australia

4. To build capacity in the mango industry to undertake integrated crop management research.

Rationale:

There is a very weak linkage between researchers, extension agents and growers or contractors in the Pakistan mango industry. Many researchers appear not to be very versed with current production practices and management strategies of the major pests and diseases. Activities under this objective are aimed at addressing several of these limitations.

Activities:

- 4.1 Develop modules and conduct training courses and workshops for researchers and extension agents in general orchard management practices and in disease and pest management strategies.
- 4.2 Link up and use existing Farmer Field School approaches of NARC and CABI and establishment of self managing farmer groups, to enhance skills development and improve information flow to growers, contractors and field workers in mango productivity and quality.
- 4.3 Provide scientists with needed mango RD&E training through different group and graduate degree programs so that their capacity to undertake research is enhanced.
- 4.4 Investigate the development and delivery of on-line training and information for mango growers and agribusiness information providers in Australia.

Project implementation is contingent on approval times in Pakistan. The ASLP coordinator is due to visit Pakistan mid September, to facilitate the Pakistan approval process. However, it is uncertain as to how long this will take. At this stage, estimates for a project start date range between a 1st of December start (optimistic estimate) to 1st April 2007. This has implications for project duration extending beyond the formal life of the ASLP, an issue which is discussed in more detail in section 3.5.

A.2.2 Mango sector exposure visit by Pakistan technical experts and agribusiness entrepreneurs to Australia

This activity will take place as planned in November/December 2006, to coincide with the Australian mango harvesting season. The Australian Mango Industry Association and QDPI&F will take the lead in planning the programme and hosting the Pakistan delegation.

A.2.3 Development and delivery of training modules on post-harvest management

A.2.4 R & D project to develop efficient mango supply chains and improve value adding

Similarly to A.1.3+A.1.4+A.1.5, activities to progress this cluster are well underway. Building on the outcomes of the workshop and the mango supply chain constraints analysis, a final version of the project proposal has been developed in close consultation with the Pakistan partners. This proposal has been formally submitted to ACIAR in time for the August in-house review. If approved by ACIAR's Board of Management early September, the proposal could be finalised and sent to Pakistan for approval by mid September. The institutions formally involved in this project include University of Queensland (Commissioned Organisation) and Western Australian Dept. of Agriculture from Australia and, within Pakistan, the Pakistan Horticulture Export and Development Board, the University of Agriculture Faisalabad and selected partners from the private sector.

This activity has now been structured around four objectives:

1. To improve and maintain mango quality from harvest to consumption

Rationale

Activities targeting this objective focus on enhancing and maintaining mango quality along the supply chain, based on an understanding of the basic physiological attributes of the two main cultivars, Sindhri and Chaunsa. Particular attention will be given to improving current post harvest practices so as to increase shelf life and marketability.

R&D and capacity building activities:

- 1.1 A training case study of an Australian export mango supply chain (capacity building for commercial operators, PHDEB and UAF staff)
- 1.2 Set up postharvest laboratory at UAF and train staff; document, verify and evaluate present postharvest handling practices so as to identify key causes of quality loss in mangoes; use this information to undertake research on storage, hot water treatments, ripening protocols, optimum harvest maturity, postharvest diseases and the development of pre and post harvest control protocols (this activity is linked to the activities of ASLP activity A.1.3-5. Training will also be given to postharvest staff at AARI (Ayub Agricultural Research Institute) Faisalabad and PARC in Karachi.
- 1.3 Identifying the causes of skin browning in Australian mangoes
- 1.4 Training of two Pakistani R&D collaborators in Australia

2. To identify present market needs and likely future opportunities for Pakistan and Australian mangoes, using this information to inform the analysis of existing supply chains and the development of improved supply chain management systems and practices

R&D and capacity building activities:

- 2.1 Market research in existing domestic and export (Dubai, UK, Singapore) markets, results used to target training and commercial activities of demonstration supply chains
- 2.2 Desktop and in-country research to identify new markets (e.g. China) or market segments (e.g. segment serviced by emerging modern Pakistan supermarkets)
- 2.3 A case study of a market which the Pakistan mango industry could use as a model of successful development (incorporated with R&D activity 3.3)

3. To work with selected mango supply chains to enhance quality, improve profitability and demonstrate to the rest of the industry how supply chain management can improve competitiveness

R&D and capacity building activities:

- 3.1 Determine specific political, social, economic or environmental factors that impact on the application of supply chain management principles in the Pakistani mango industry, using this analysis to develop the chain building approach in activity 2.
- 3.2 Taking the results from activity 3.1 and the Australian mango supply chain case study (activity 1.1) into account, initiate, develop and monitor three demonstration supply chains (one domestic, two export). This activity is training based, with a strictly commercial focus.
- 3.3 Undertake a comparative study of the three case study mango chains initiated under activity 3.2 (may also include a case study of a successful mango exporting country)

4. To build capacity in Pakistan and Australian mango R, D & E institutions to conduct supply chain analysis and implement improved supply chain management practices

Activities under this objective are integrated into the activities of the three objectives above.

The ASLP Coordinator will liaise closely with AusAID in Islamabad to source appropriate post-graduates through the AusAID scholarship programs.

Horticulture - citrus

B.1.1 Short term visits by Australian citrus experts to Pakistan

B.1.2 Technical workshop on citrus diseases, tree/orchard agronomy and irrigation and drainage management

As outlined in section 2.2, these two activities were deferred and took place in July 2006. An Australian team has just returned from a very successful visit and workshop and is due to report back key findings and recommendations in the course of the next month.

B.1.3 Development and delivery of training modules on participatory research and extension methodologies in citrus production

B.1.5 R & D project to improve citrus production through improved disease, certified nursery, orchard and water management.

Detailed planning and project development has commenced based on the outcomes of B.1.1 and B.1.2. It is anticipated that a citrus project will be submitted to ACIAR in October or November. It is likely to be structured around the following objectives and activities:

1. **Enhance national germplasm introduction and evaluation systems and improved nursery stock production systems, focussing on disease freedom, cultivar integrity and root stock selection.**
 - Source and evaluate new germplasm
 - Implement nursery certification scheme
 - Best practice production systems
 - Skills development and technical exchange
2. **Improve productivity by better orchard husbandry and water management focussing on tree spacing, tree management, nutrition and irrigation**
 - Demonstration blocks
 - Production manuals
 - Skills and technical transfer
 - Technical exchanges
3. **Enhance management of citrus pests and disease, focussing on control of Huanglongbing (greening), *Phytophthora* bacterial canker and tree decline**
 - Development of strategies for greening and canker
 - R&D into citrus decline
 - Grower production guides
 - Skills and technical transfer
 - Technical exchanges
4. **Enhance the uptake and application of improved management systems, post harvest technology, new technologies and production skills**
 - Extension skills development
 - Alternative extension models (eg grower groups)
 - Development of extension materials

Livestock - dairy

C.1.2 R & D project to develop and implement improved animal husbandry and nutrition for increased milk production

C.1.3 Development and delivery of training modules on participatory research and extension activities in dairy production

C.1.6 Evaluation of germplasm introduced from Australia

A general approach has been designed to address this cluster, based on the preliminary input from the recently completed dairy mission and earlier visits to Pakistan by ACIAR staff. Details of the project design were further discussed during a workshop in Canberra involving ACIAR and the dairy mission team in late June. A full proposal is expected to be submitted to ACIAR in October following a project development mission involving Dr Bill Winter (ACIAR RPM for Livestock Production Systems) and Dr Suresh Gulati from the University of Sydney (designated Australian lead agency) aiming for an April 2007 start. At this stage, the likely structure of the intervention is organised around two themes, with a strong emphasis on synthesising and disseminating existing information and training and capacity building activities, as follows:

Theme 1: Support for a model system of smallholder dairy production

Smallholder dairy farmers are the intended beneficiaries of this activity. The immediate target however are the research scientists and extension officers providing information to those farmers. The focus of this effort will be in two contrasting environments, i.e. the National Rural Support Program (NRSP) dairy development program at Bhakkar, and at Okara where the dairy sector is more established and there is both smallholder and commercial dairy farmers and systems.

An early activity involving NRSP and Punjab Dept. of Livestock Development staff and extension trainees will be to undertake surveys of smallholder farmers from a whole-of-system context, considering issues such as feed resources and product output, the economics of the crop and livestock and off-farm activities within some different wealth classes. These surveys will be a learning experience in their own right, and will help to inform the project team about how to balance the motivations of farmers with the resources available and with the range of potential technical interventions.

The second activity will be to develop and deliver training modules in extension methodologies that involve a more participatory approach. Obviously these activities are linked as the resolution of problems identified by farmers must be done from a farming systems perspective, rather than from a simple component basis.

Theme 2: Capture & enhancement of knowledge relevant to smallholder dairy systems

This theme will address important structural and technical issues for the immediate and longer-term development of the dairy sector:

- Assemblage of technical information already in existence in Pakistan;
- Promoting greater interaction between scientists and agencies for their personal benefit and that of the sector;
- Advanced scientific training and establishment of professional linkages between Pakistani and Australian scientists;
- Promoting dialogue between the research and extension communities and development of systems thinking among scientists.

A vast amount of technical information is available in Pakistan of relevance to the dairy sector, but much of it has yet to be interpreted and packaged in a manner suitable for use in training of extension personnel and/or from a farming systems perspective. This has occurred because of poor linkages between research and extension and the discipline focus of scientists. This project can stimulate this process by bringing the technical experts together with the extension trainers

to package information in a fashion relevant to the needs of the service providers to smallholders. The number and membership of the scientific networks/groups has not been defined at this stage, but is likely to include areas such as crop and forage production, dairy cow husbandry (nutrition, health, reproduction, environment) and genetics. The groups will include recognised discipline leaders as well as young/next generation leaders to sustain the new systems and collaborative approach.

As information comes together in the activity outlined above, gaps in knowledge and expertise will become evident. These areas will become the focus for technical training, particularly in those areas where Australian scientists are well positioned to add value to their Pakistani counterparts. It is likely that in some instances this training will be of an advanced nature, with information and knowledge more relevant to the future development of the smallholder dairy sector or maybe the larger commercial sector than to current smallholder circumstances. Opportunities to source suitable candidates for PhD and MSc scholarships will be actively sought in close liaison with the AusAID ASLP scholarships program and the AusAID Australian Leadership Award scheme. Discussions have also been held with Prof John Webb as to using the DEST vocational training scheme to train larger numbers of extensionists identified in the course of this activity for training in contemporary extension methodologies in Australia.

As a guide, the potential agencies involved in these activities will include NARC, Punjab Dept of Livestock Development; Livestock Production Research Institute, Okara; University of Agriculture Faisalabad; Fodder Research Institute, Sargodha; Livestock and Fisheries Dept, Sindh; Sindh Agricultural University; and NRSP. From the Australian side, the project will be led by the University of Sydney, with specialist input from a range of other institutions in Australia (QDPI, CSIRO, DPI Vic).

Refinement of policies at the National and Provincial levels, as they affect the development of the smallholder and commercial dairy sectors, and the trade linkages between Pakistan and Australia to support dairy development, were also considered areas of significant importance. However, it was agreed that they should be addressed separately given that they may require different disciplinary skills and agencies than those required to address Themes 1 & 2. This may occur through an ACIAR-funded small research activity, outside of the ASLP portfolio of activities.

C.1.4 Dairy sector exposure visit by Pakistan technical experts and agribusiness entrepreneurs to Australia

This activity is scheduled to take place in the period 18th August to 7th September through an Austrade coordinated delegation of Pakistan dairy industry. The composition of the Pakistan team and their itinerary in Australia has been determined in close liaison with Dairy Pakistan and Austrade.

C.1.5 Sourcing and transfer of animal germplasm (Australian Friesian Sahiwal) and drought and salt-tolerant forage germplasm from Australia to Pakistan

Delegates for a Pakistan germplasm mission to Australia in September 2006 to select animal germplasm have been nominated and the planning of their itinerary and contacts with Australian dairy breeders is underway. Liaison with Austrade will be maintained in this activity. Originally it was planned to merge this activity with activity C.1.4, but a mismatch of itineraries and timing issues have now made it necessary to separate these two missions. It is planned to organise a dairy workshop for both Pakistan delegations upon their return, to facilitate linkages between the Pakistan dairy private sector and the dairy research sector.

3.3 Communication

It is planned to establish an ASLP website in August 2006, hosted on the ACIAR website. This website would provide a repository for all reports, documents, workshop proceedings, presentations etc. generated in the course of the ASLP. It will also provide a means of keeping all interested parties updated on planned workshops and reciprocal visits, including the provision of details on programmes and itineraries. Involvement by ACIAR communications staff in the development and maintenance of the website will ensure consistency and quality standards of all posted information are met. AusAID will be consulted on the development, structure and content of the website.

3.4 Steering Committee

The first Steering Committee meeting is proposed for early FY 06-07, most likely in October. This will provide an opportunity for stakeholders to assess the ASLP's progress to date and to become updated on the details of the four R&D projects being designed (thus providing an opportunity to provide further specifics for the operational plan 06-07). In addition, it is anticipated that the steering committee meeting might also endorse any changes to the Pakistan approval process.

In the coming weeks, the ASLP Coordinator will liaise with AusAID and MINFAL to establish to most convenient venue and date for the meeting and to confirm the agenda.

3.5 Risk Management

An updated risk assessment framework and management plan is provided on the next page. The highest order operational risk continues to be the potential for changed internal security conditions that may lead to an inability of Australian experts and project staff to travel to Pakistan due to ensuing travel restrictions. At the time of the development of the ASLP Implementation Plan, this risk was judged to low to medium, albeit having a very high to high impact on the ASLP. Developments in recent months (riots and bombings in the wake of the Danish cartoon incident; visit of US President Bush; increased levels of sectarian violence) have heightened this risk to medium. However, despite the increased risk, Australian teams were able to visit Pakistan. Their safety was ensured through close liaison with MINFAL, that put in place a series of additional security measures (e.g. police escorts) to ensure the risks were minimised.

Slippage of project implementation constitutes another problem likely to occur. The ASLP coordinator will engage with relevant authorities in EAD and MINFAL and explore options to streamline the approval process. In doing so, he will enlist the support of AusAID through its Regional Manager, Mr Percy Stanley, who has offered his support to seek approval conditions for the ASLP that are similar to those obtained by AusAID in its earthquake relief and scholarship programs. Should this prove to be successful then approval and implementation times should be in the order of 3 months, allowing for the mango projects to start in December 2006 followed by the citrus and dairy project no later than April 2007. Should it not be possible to streamline the approval process or should there be delays to implementation for other reasons (e.g. longer project development and design times), these will be addressed by compressing the activities into shorter duration projects where feasible (citrus and dairy projects); in the case of the mango projects, it may be necessary to carry over funds after the formal end of the ASLP into FY 09-10 by way of an unfunded extension of the ASLP until 31st December 2009, in order for these projects to have sufficient time for completion.

Updated risk assessment framework and management plan (*italics denote changes since Nov. 05*)

Category	Description of Risk	Probability	Impact on Task	Containment Measures
institutional	incentive structures within Pakistan NARES inhibit transition of researchers to participatory research and extension modality	medium	high	maintain close liaison with PARC leadership to support research management and institutional change
scope definition	program duration too short for interventions tested to deliver impacts in R&D projects	medium to high	medium to high	maintain funding to selected topics through ACIAR core program beyond life of ASLP
scope definition	scope too broad for resources available	low	medium to high	renegotiate tasks and/or reduce scope; reassign resources
security	short-term restrictions for Australians to travel to Pakistan	<i>medium</i>	high	bring forward activities in Australia, defer activities in Pakistan; <i>provision of additional security by Pakistan authorities</i>
security	long-term restrictions for Australians to travel to Pakistan	low	very high	enlist support of South Asia based CGIAR centres (ILRI, IWMI); appoint higher level local technical support; shift emphasis of plan and downsize field research dependant on Australian input and increase range of activities possible in Australia (<i>exposure visits, training</i>)
resources	staff of commissioned organisation resign or unavailable	low to medium	high to medium	outsource to other providers; reappoint; renegotiate tasks and/or reduce scope
resources	staff of commissioned organisation lack appropriate knowledge and/or skills	low	high	resource appropriately; close scrutiny of commissioned organisation staff; form consortia with track record to spread risk
<i>contractual</i>	<i>longer project development and design timelines; delays in Pakistan sign-off procedures</i>	<i>medium</i>	<i>high</i>	<i>compress activities into a shorter timeframe to account for some slippage of project start dates during project design; allow unfunded extension of projects for up to 6 months beyond formal finish of ASLP</i>
contractual	collaborators do not provide in-kind contribution	low	high	renegotiate tasks and resources; defer payments
organisational	changes to organisational structures	low	medium	renegotiate tasks and/or reduce scope; reassign resources; defer payments
timing/schedule	milestones not delivered on time	low to medium	medium	reassign existing resources; defer payments
technical	poor quality outputs	low	high	resource appropriately; outsource to other providers; defer payments;
communications	communications plan ineffective	low	high	resource appropriately; revise plan
environmental	detrimental impacts on environment	low	low	revise plan

4. Budget

4.1 FY 05-06

The year-to-date expenditure budget is summarised in the table below; a formal acquittal for the period July-Dec 2005 is provided in the appendix of this document. Overall, the ASLP has been operating to budget. However, a few variations need some explanation. Activity A.1.1 is above budget to cater for the broadening of the mission's terms of reference and the inclusion of additional team members. Conversely, the mango workshop (A.1.2) has come under budget to savings in travel expenses achieved through the synchronisation of A.1.1, A.1.2 and A.2.1. Due to slippage of activities B.1.1, B1.2, C.1.1 and C.1.5, actual expenditure is below forecast, but it is anticipated that funds for A.1.1, A.1.2, B.1.4 and C.1.1 will be fully drawn down this and next FY, whilst funds committed for B.1.1, B.1.2 and C.1.5 will have to be carried forward into next FY. The contingency funds were slightly reduced to cater for higher than anticipated program management costs arising out of the initial program set up; these costs in the out years are anticipated to fall back to the original budgeted levels.

ASLP code	Short title	FY 05-06 as per Plan	FY 05-06 forecast	FY 05-06 actual
A.1.1	Diagnosis of dieback and malformation	100,000	124,164	124,164
A.1.2	Workshop mango production	100,000	57,184	57,184
A.1.3	Training modules mango production			
A.1.4	R&D project mango diseases			
A.1.5	R&D project orchard/water management			
A.2.1	Scoping study/supply chain analysis	100,000	108,455	108,455
A.2.2	Industry exposure visit			
A.2.3	Training modules mango supply chain			
A.2.4	R&D project supply chain mgt			
B.1.1	Expert visit citrus production	60,000	60,000	1,920
B.1.2	Workshop citrus production	100,000	100,000	3,184
B.1.3	Training modules citrus production			
B.1.4	Industry exposure visit	105,000	104,840	104,840
B.1.5	R&D project citrus production			
C.1.1	Scoping study/constraints analysis	100,000	110,878	21,823
C.1.2	R&D project dairy animal productivity			
C.1.3	Training modules dairy production			
C.1.4	Industry exposure visit			
C.1.5	Sourcing and transfer of germplasm	60,000	60,000	0
C.1.6	Evaluation of germplasm			
	Contingency for changed priorities	29,000	24,000	16
	<i>Subtotal - program activities</i>	<i>754,000</i>	<i>749,521</i>	<i>421,586</i>
	PSO salary and operating	21,000	16,000	12,671
	Travel coordinator	15,000	25,000	30,081
	<i>Subtotal ASLP management costs</i>	<i>36,000</i>	<i>41,000</i>	<i>42,752</i>
	Total ASLP	790,000	790,521	464,338

4.2 FY 06-07

The projected budget for FY 06-07 is summarised below. The main change with respect to the original plan is the clustering of various activities into larger integrated projects, as discussed in section 3.2. A slight rebalancing of funds between clusters A.1.3+A.1.4+A.1.5 and A.2.3+A.2.4 is also proposed in order to cater for the inclusion of post harvest work in the latter cluster. Some contingency funds and some of the savings generated through below cost workshops and scoping missions will be used to further boost the budget of the mango supply chain project. Any additional budget savings will be used to boost the budget for the citrus project, which looks to be under resourced in view of the likely objectives it will attempt to address.

ASLP code	Short title	Balance 30-Jun-06	FY 06-07 as per plan	FY 06-07 forecast
A.1.1	Diagnosis of dieback and malformation	-24,164	0	0
A.1.2	Workshop mango production	42,816	0	0
A.1.3	Training modules mango production	}	500,000	258,461
A.1.4	R&D project mango diseases			
A.1.5	R&D project orchard/water management			
A.2.1	Scoping study/supply chain analysis	-8,455	0	0
A.2.2	Industry exposure visit	0	105,000	105,000
A.2.3	Training modules mango supply chain	}	200,000	379,330
A.2.4	R&D project supply chain mgt			
B.1.1	Expert visit citrus production	58,080	0	42,000
B.1.2	Workshop citrus production	96,816	0	30,000
B.1.3	Training modules citrus production	}	100,000	100,000
B.1.5	R&D project citrus production			
B.1.4	Industry exposure visit	160	0	0
C.1.1	Scoping study/constraints analysis	78,177	0	78,177
C.1.2	R&D project dairy animal productivity	}	375,000	275,000
C.1.3	Training modules dairy production			
C.1.6	Evaluation of germplasm			
C.1.4	Industry exposure visit	0	105,000	105,000
C.1.5	Sourcing and transfer of germplasm	60,000	20,000	80,000
	Contingency for changed priorities	28,984	78,500	50,000
	<i>Subtotal - program activities</i>	<i>332,414</i>	<i>1,483,500</i>	<i>1,502,968</i>
	PSO salary and operating	8,329	31,500	31,500
	Travel coordinator	-15,081	15,000	15,000
	<i>Subtotal ASLP management costs</i>	<i>-6,752</i>	<i>46,500</i>	<i>46,500</i>
	Total ASLP	325,662	1,530,000	1,549,468

5. Appendices

5.1 List of Acronyms

ADB	Asian Development Bank
AFS	Australian Friesian Sahiwal
ALP	Agriculture Linkages Program
ASLP	Agriculture Sector Linkages Program
DAWA	Dept. of Agriculture Western Australia
EAD	Economic Affairs Division
JAF	John Allwright Fellowship
MINFAL	Ministry for Food, Agriculture and Livestock
MSDS	Mango Sudden Decline Syndrome
NARC	National Agricultural Research Center
NGO	Non-Government Organisation
NRSP	National Rural Support Program
NSW DPI	New South Wales Dept. of Primary Industries
NWFP	North West Frontier Province
PARC	Pakistan Agricultural Research Council
PHDEB	Pakistan Horticulture Development and Export Board
QDPI&F	Queensland Dept. of Primary Industries and Fisheries
R&D	Research and Development
R, D&E	Research, Development and Extension
UAF	University of Agriculture Faisalabad
UQ	University of Queensland
UWS	University of Western Sydney