Pakistan agriculture sector challenges, policy interventions and ACIAR's policy research

Dr Ejaz Qureshi
RPM, Agricultural Development Policy program

ACIAR

AUSTRALIAN CENTRE FOR INTERNATIONAL AGRICULTURAL RESEARCH
Outline

• Overview of ACIAR
• Global challenges and ACIAR’s contribution
• Importance of the agriculture sector in Pakistan and the issues and challenges the sector faces
• Desired policy interventions and management options
• Research focus of ADP program and research activities including in Pakistan
• Lessons and recommendations
What is ACIAR?

- A statutory authority within the Australian Government’s Foreign Affairs and Trade portfolio
- Part of Australia’s Aid Program, with the objectives of advancing Australia’s national interest through poverty reduction and sustainable development
- A research funder and manager
Pressing global challenges

- Developing more sustainable food systems
- Using less land, water, nutrients & energy per unit output
  - increasing productivity
- Conserving biodiversity and improving livelihoods
- Decoupling economic growth from carbon emissions
- Adapting to an increasingly difficult climate
- Shifting from fossil fuels to renewable energy
- Doing all of this simultaneously
Out of a world population of 7 billion:

- About 2 billion people suffer from micronutrient malnutrition.
- Nearly 800 million people suffer from calorie deficiency.

Out of 5 billion adults worldwide:

- Nearly 2 billion are overweight or obese.
- One in 12 has type 2 diabetes.

Out of 667 million children under age 5 worldwide:

- 159 million under age 5 are too short for their age (stunted).
- 50 million do not weigh enough for their height (wasted).
- 41 million are overweight.

From Promise to Impact. Ending malnutrition by 2030. (IFPRI 2016)
3 main development challenges now and in 5-10 years

ACIAR is responding...

A new Strategic Plan 2017-2027 being prepared that will include:

1. Research portfolio is mostly sectoral, but grand challenges are cross-sectoral. So we are considering new programs on cross-cutting issues (e.g. climate, gender, value chains, human health and nutrition)

2. Capacity building – a wider range of approaches; increased investment, alumni network

3. Evaluating impacts – to be a world leader
What we do?

- Commission research into improving sustainable agricultural production in developing countries – bilateral and multilateral projects
- Pilot development activities related to research
- Fund project related capacity building
- Conduct impact assessments
- Communicate the results of research
- Administer Australia’s contribution to the International Agricultural Research Centres
Importance of agriculture sector in Pakistan - facts

- Share of agriculture in GDP is about 20% (since 2010) from about 40% (in early 60s)
- Combined share of industrial and services sectors is more than 80%
- Livelihoods of about half of the country’s population, employing approximately 24 million people
- Foreign earnings (cotton, rice and leather plus cotton textiles and ready made garments) 38% of the total export earnings
- Rural non farm income (from early to mid 2000s) contributed between 40 and 57% to the total rural household income

Sources: GoP 2014; Farooq 2014; World Bank 2007; Dorosh et al. 2003
GDP, agricultural GDP, and share of labor in agriculture in Pakistan, FY 1980–2014

Sub-sectoral shares in agricultural GDP, 1990–2013

Agricultural and TFP growth rates, Pakistan, 1961–1965 to 2011–2013

Agricultural input, output and total factor productivity growth, Pakistan, 1960/61–2012/13

Agriculture sector development issues

• Agri sector growth-rate in 90s at 4.4% but slowed to just 2.6% of GDP in 2000-2012

• There is not great welfare improvement and poverty remains high in the agriculture sector/rural economy (close to 30%)

• Food security is becoming a major issue

• Some 30% of the population is undernourished

• The livelihood of about 50% of the population still depends on agriculture
FIGURE 2.2  COUNTRY PROGRESS IN REDUCING GHI SCORES
Percentage change in 2015 GHI compared with 2000 GHI

Note: An increase in the GHI indicates a worsening of a country’s hunger situation. A decrease in the GHI indicates an improvement in a country’s hunger situation. GHI scores were not calculated for countries with very small populations.

Grember et al. 2015 Global Hunger Index: Armed Conflicts and Challenges of Hunger, IFPRI, Washington, D.C.
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>107</td>
<td>Pakistan</td>
<td>43.4</td>
<td>37.8</td>
<td>35.1</td>
<td>33.4</td>
</tr>
<tr>
<td>29</td>
<td>China</td>
<td>26.4</td>
<td>15.9</td>
<td>11.5</td>
<td>7.7</td>
</tr>
<tr>
<td>64</td>
<td>Viet Nam</td>
<td>41.5</td>
<td>30.2</td>
<td>22.1</td>
<td>14.5</td>
</tr>
<tr>
<td>90</td>
<td>Bangladesh</td>
<td>52.4</td>
<td>38.5</td>
<td>32.4</td>
<td>27.1</td>
</tr>
</tbody>
</table>

**TABLE 3** Global Hunger Index scores (various years), ranked by 2016 country scores

FIGURE 3.4 Indicators of malnourishment in Pakistan, 1990–2011


Agriculture sector issues and challenges

- Stagnating crop yields with wide gaps between progressive and average farmers
- Poor quality and inadequate supply of inputs and lack of infrastructure
- Under-performance of rural factor and input markets
- High pre and post-harvest losses
- Declining investment including in research, development and extension
- Frequent insect and pest attacks and high incidence of crop and livestock diseases
- Lack of capital and financial resources
- Lack of international competitiveness of some agricultural commodities
- Low crop diversification
- Highly skewed distribution of farm size and low economy of size and scale
- Inadequate supply of water and the inefficient use of available water resources
  - Gap between Operation and Maintenance (O&M) expenditure and revenue collection is 68%, 80% and 77% for Punjab, Sindh and KPK, respectively
Predominantly Small Farms - The Total Number of Under 5 Acres Farms has More than Tripled since 1960
FIGURE 2.4 Yield per hectare of major crops and maize, 1990/1991–2012/2013

Source: Authors, based on data from GoP (2013).
Note: kg = kilograms; ha = hectares; MT = metric tons.
<table>
<thead>
<tr>
<th>Year</th>
<th>Seed Cotton</th>
<th>Potato</th>
<th>Wheat</th>
<th>Chic-pea</th>
<th>Rice</th>
<th>Sugar Cane</th>
<th>Maize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>1.13</td>
<td>0.69</td>
<td>0.71</td>
<td>0.79</td>
<td>0.66</td>
<td>0.67</td>
<td>0.38</td>
</tr>
<tr>
<td>1991</td>
<td>1.34</td>
<td>0.72</td>
<td>0.75</td>
<td>0.69</td>
<td>0.66</td>
<td>0.67</td>
<td>0.39</td>
</tr>
<tr>
<td>1992</td>
<td>1.05</td>
<td>0.75</td>
<td>0.78</td>
<td>0.72</td>
<td>0.66</td>
<td>0.71</td>
<td>0.35</td>
</tr>
<tr>
<td>1993</td>
<td>0.93</td>
<td>0.74</td>
<td>0.77</td>
<td>0.52</td>
<td>0.76</td>
<td>0.72</td>
<td>0.38</td>
</tr>
<tr>
<td>1994</td>
<td>1.02</td>
<td>0.89</td>
<td>0.77</td>
<td>0.55</td>
<td>0.67</td>
<td>0.75</td>
<td>0.36</td>
</tr>
<tr>
<td>1995</td>
<td>1.13</td>
<td>0.89</td>
<td>0.83</td>
<td>0.66</td>
<td>0.75</td>
<td>0.74</td>
<td>0.42</td>
</tr>
<tr>
<td>1996</td>
<td>0.95</td>
<td>0.81</td>
<td>0.78</td>
<td>0.86</td>
<td>0.76</td>
<td>0.75</td>
<td>0.38</td>
</tr>
<tr>
<td>1997</td>
<td>0.99</td>
<td>0.69</td>
<td>0.76</td>
<td>0.70</td>
<td>0.74</td>
<td>0.67</td>
<td>0.39</td>
</tr>
<tr>
<td>1998</td>
<td>0.99</td>
<td>0.85</td>
<td>0.83</td>
<td>0.90</td>
<td>0.76</td>
<td>0.77</td>
<td>0.39</td>
</tr>
<tr>
<td>1999</td>
<td>1.19</td>
<td>1.08</td>
<td>0.79</td>
<td>0.84</td>
<td>0.79</td>
<td>0.72</td>
<td>0.40</td>
</tr>
<tr>
<td>2000</td>
<td>1.13</td>
<td>1.04</td>
<td>0.92</td>
<td>0.74</td>
<td>0.78</td>
<td>0.72</td>
<td>0.41</td>
</tr>
<tr>
<td>2001</td>
<td>1.00</td>
<td>1.04</td>
<td>0.85</td>
<td>0.60</td>
<td>0.70</td>
<td>0.71</td>
<td>0.40</td>
</tr>
<tr>
<td>2002</td>
<td>1.07</td>
<td>0.99</td>
<td>0.84</td>
<td>0.49</td>
<td>0.78</td>
<td>0.74</td>
<td>0.43</td>
</tr>
<tr>
<td>2003</td>
<td>0.97</td>
<td>1.02</td>
<td>0.89</td>
<td>0.95</td>
<td>0.75</td>
<td>0.72</td>
<td>0.45</td>
</tr>
<tr>
<td>2004</td>
<td>1.13</td>
<td>1.01</td>
<td>0.81</td>
<td>0.78</td>
<td>0.74</td>
<td>0.76</td>
<td>0.58</td>
</tr>
<tr>
<td>2005</td>
<td>1.03</td>
<td>1.07</td>
<td>0.91</td>
<td>0.96</td>
<td>0.78</td>
<td>0.70</td>
<td>0.62</td>
</tr>
<tr>
<td>2006</td>
<td>0.98</td>
<td>0.80</td>
<td>0.90</td>
<td>0.59</td>
<td>0.77</td>
<td>0.73</td>
<td>0.61</td>
</tr>
<tr>
<td>2007</td>
<td>0.93</td>
<td>1.19</td>
<td>0.99</td>
<td>0.98</td>
<td>0.77</td>
<td>0.75</td>
<td>0.65</td>
</tr>
<tr>
<td>AVE</td>
<td>1.05</td>
<td>0.90</td>
<td>0.83</td>
<td>0.74</td>
<td>0.74</td>
<td>0.72</td>
<td>0.44</td>
</tr>
</tbody>
</table>

Large variability of Crop Yields across Agro-climatic Zones in Pakistan 2010-11

<table>
<thead>
<tr>
<th></th>
<th>Wheat</th>
<th>Rice</th>
<th>Maize</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient of Variation (%)</td>
<td>31.39</td>
<td>38.16</td>
<td>77.35</td>
</tr>
<tr>
<td>Mean</td>
<td>2,584 (811)</td>
<td>2,088 (797)</td>
<td>2,721 (2105)</td>
</tr>
</tbody>
</table>

Source: Computed from HIES (2010-11)
Limited diversification

Source: Agriculture Census of Pakistan
Water availability and population growth, 1951–2025 (Cubic meters)

Source: WWF-Pakistan, 2007
<table>
<thead>
<tr>
<th>Water Sources</th>
<th>MAF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface water reservoirs (Kalabagh, Basha, and Dassu)</td>
<td>17</td>
</tr>
<tr>
<td>Surface water reservoirs (12 small dams sites proposed)</td>
<td>16</td>
</tr>
<tr>
<td>Water lost in canals and distributaries</td>
<td>21</td>
</tr>
<tr>
<td>Water lost in minors</td>
<td>5</td>
</tr>
<tr>
<td>Water lost in water courses</td>
<td>15</td>
</tr>
<tr>
<td>Ground Water</td>
<td>9</td>
</tr>
<tr>
<td>Sub Total:</td>
<td>83</td>
</tr>
</tbody>
</table>

Source: WAPDA (2010)
<table>
<thead>
<tr>
<th>Year</th>
<th>Water Required (MAF)</th>
<th>Water Available at Farm Gate (Surface+Groundwater) (MAF)</th>
<th>Shortage (MAF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>149</td>
<td>109</td>
<td>40</td>
</tr>
<tr>
<td>2013</td>
<td>215</td>
<td>107</td>
<td>108</td>
</tr>
<tr>
<td>2025</td>
<td>277</td>
<td>126</td>
<td>151</td>
</tr>
</tbody>
</table>

Source: WAPDA (2010)
Post harvest losses
# Postharvest Losses in Peaches (Swat)

<table>
<thead>
<tr>
<th>Crops</th>
<th>Post Harvest Losses (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fruits</strong></td>
<td></td>
</tr>
<tr>
<td>Citrus</td>
<td>15</td>
</tr>
<tr>
<td>Mango</td>
<td>25</td>
</tr>
<tr>
<td>Dates</td>
<td>35</td>
</tr>
<tr>
<td>Apple</td>
<td>14</td>
</tr>
<tr>
<td>Pear</td>
<td>15</td>
</tr>
<tr>
<td>Peach</td>
<td>15</td>
</tr>
<tr>
<td>Plum</td>
<td>25</td>
</tr>
<tr>
<td>Apricot</td>
<td>25</td>
</tr>
<tr>
<td>Other fruits</td>
<td>24.4</td>
</tr>
<tr>
<td><strong>Vegetables</strong></td>
<td></td>
</tr>
<tr>
<td>Potato</td>
<td>15.2</td>
</tr>
<tr>
<td>Onion</td>
<td>20</td>
</tr>
<tr>
<td>Tomato</td>
<td>40</td>
</tr>
<tr>
<td>Other vegetables</td>
<td>30.5</td>
</tr>
</tbody>
</table>

Ibrahim & Anwar, 2004, Horticulture Education, Extension & Training System in Pakistan
## Requirement of Processing Units

(000)Tones

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Production (2009-10)</th>
<th>Marketable Volume @ 75% of Production</th>
<th>Export (2009-10)</th>
<th>Export Potential</th>
<th>Existing No. of Units</th>
<th>Total Annual Existing Capacity[^1]</th>
<th>Gap V/S available capacity</th>
<th>No. of Units Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citrus</td>
<td>2395</td>
<td>1796</td>
<td>361</td>
<td>400</td>
<td>110</td>
<td>495</td>
<td>-95</td>
<td></td>
</tr>
<tr>
<td>Mango</td>
<td>1875</td>
<td>1406</td>
<td>85</td>
<td>200</td>
<td>9[^#]</td>
<td>27</td>
<td>173</td>
<td>23[^2]</td>
</tr>
<tr>
<td>Seasonal Vegetables</td>
<td>3508</td>
<td>2631</td>
<td>86</td>
<td>120</td>
<td>0</td>
<td>0</td>
<td>100</td>
<td>17[^4]</td>
</tr>
</tbody>
</table>

[^1] Based at full operation,
[^2] Based on 5-10 tons/hr capacity,
[^3] For fresh Dates based on 1 ton/hr capacity,
[^4] Based on 3 ton/hr capacity
[^#] Including projects being supported by FIRMS-USAID

---

Pakistan Horticulture Development & Export Company, Ministry of Commerce, Government of Pakistan
Lack of storage facilities for horticulture products

<table>
<thead>
<tr>
<th>Clusters</th>
<th>Production (2009-10)</th>
<th>Marketable Volume @ 80% of Production</th>
<th>Storag e Requirement</th>
<th>Stores Available In Pakistan</th>
<th>Gap/Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kinnow</td>
<td>2395</td>
<td>1796</td>
<td>539</td>
<td>194</td>
<td>345</td>
</tr>
<tr>
<td>Mango</td>
<td>1875</td>
<td>1406</td>
<td>70</td>
<td>25</td>
<td>46</td>
</tr>
<tr>
<td>Apple</td>
<td>459</td>
<td>344</td>
<td>138</td>
<td>34</td>
<td>103</td>
</tr>
<tr>
<td>Other Fruits</td>
<td>2451</td>
<td>1838</td>
<td>551</td>
<td>172</td>
<td>380</td>
</tr>
<tr>
<td>Potato</td>
<td>2540</td>
<td>1905</td>
<td>762</td>
<td>323</td>
<td>439</td>
</tr>
<tr>
<td>Other Vegetables</td>
<td>5320</td>
<td>3990</td>
<td>798</td>
<td>169</td>
<td>629</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15040</strong></td>
<td><strong>11280</strong></td>
<td><strong>2858</strong></td>
<td><strong>916</strong></td>
<td><strong>1942</strong></td>
</tr>
</tbody>
</table>

Pakistan Horticulture Development & Export Company, Ministry of Commerce, Government of Pakistan
**TABLE 1  Agricultural Science and Technology Indicators**

<table>
<thead>
<tr>
<th>Low- and middle-income countries by region</th>
<th>Year</th>
<th>Agricultural research spending</th>
<th>Volatility</th>
<th>Agricultural researchers (FTEs)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2011 PPP dollars (million)</td>
<td>2011 US dollars (million)</td>
<td>as a share of AgGDP</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>2012</td>
<td>250.6</td>
<td>78.2</td>
<td>0.37</td>
</tr>
<tr>
<td>Cambodia</td>
<td>2010</td>
<td>22.4</td>
<td>7.4</td>
<td>0.18</td>
</tr>
<tr>
<td>China</td>
<td>2013</td>
<td>9,366.2</td>
<td>5,081.5</td>
<td>0.62</td>
</tr>
<tr>
<td>India</td>
<td>2014</td>
<td>3,298.4</td>
<td>1,067.8</td>
<td>0.30</td>
</tr>
<tr>
<td>Lao PDR</td>
<td>2010</td>
<td>na</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>Malaysia</td>
<td>2010</td>
<td>592.3</td>
<td>282.5</td>
<td>0.99</td>
</tr>
<tr>
<td>Nepal</td>
<td>2012</td>
<td>53.4</td>
<td>17.8</td>
<td>0.28</td>
</tr>
<tr>
<td>Pakistan</td>
<td>2012</td>
<td>332.5</td>
<td>93.7</td>
<td>0.18</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>2009</td>
<td>61.8</td>
<td>21.6</td>
<td>0.34</td>
</tr>
<tr>
<td>Viet Nam</td>
<td>2010</td>
<td>136.0</td>
<td>44.5</td>
<td>0.18</td>
</tr>
</tbody>
</table>

AGRICULTURAL R&D SPENDING AS A SHARE OF AGRICULTURAL GDP

AVERAGE FUNDING VOLATILITY BY REGION

- Africa south of the Sahara: 0.21
- South Asia: 0.12
- China: 0.09
- Latin America and the Caribbean: 0.10

1 PERCENT TARGET

Warranted policies, plans and programs

- Development and adoption of new varieties
- Better access to markets for inputs (seeds, fertilisers, farm mechanization, credit, water) and outputs
- Improved infrastructure including storage and cooling facilities
- Reduction in post harvest losses
- Greater investment in research, development and extension
- Improved quality and fulfilment of quarantine requirements for international markets and competitiveness
- Greater diversification, especially minor but high value crops
- Effort for greater selling/buying power and economy of size and scale – cluster farming/structural adjustment
- Enhanced water supply but more efficient water use through better water management
- Governance and institutional reforms in water sector
What type of policy intervention is needed to improve agriculture sector productivity and food security?

- **Supply related policies**
  - Rural infrastructure
  - Agricultural research and development, and extension
  - Institutions for agricultural resource management
  - Farm input and produce pricing

- **Demand related policies**
  - Income, growth and development
  - Education and knowledge
  - Food price stabilisation

- **Market related policies**
  - Effectiveness of markets
  - Policies to insulate local markets from global markets
  - Access to local markets

Qureshi et al. (2015), Public policies for improving food and nutrition security at different scales, Food Security, Special issue: Towards food security by 2050 DOI 10.1007/s12571-015-0443-z
Policy analysis

• Good agricultural policies are fundamental to progress in the economic, social and environmental spheres.
• AND
• Scientific and empirical evidence in policy formulation is extremely important
• It is generally a low cost process with high and immediate beneficial impacts
  – Costs imposed by poor decisions are reduced through decisions which rely on rigorous and objective evidence
ACIAR’s ADP program

- Agricultural development policy is one of the 12 programs of ACIAR

- ADP program operates in both the micro scale dimension and macro scale dimension

- The Program supports both stand-alone projects and multidiscipline-based projects across the ACIAR research programs.

- Policy components operate in several biophysical program areas, including AGB, FST, LPS and LWS.

- The project helps understand:
  - Commonly used agricultural policy alternatives
  - Impact of the increasing regional/globalisation of trade and associated rules-based approaches
  - Impact of domestic markets on supply, demand and price
  - Impact of domestic market and trade-regulatory developments
  - Impact of agricultural reform, land and water use policy, forest policy and food security policy, regulation and environmental-management regimes and institutions
Prioritisation principles of ADP policy projects

- Political environment in the recipient country
- Receptiveness (appetite) of the policy work is at right time
- Project is realistic with greater depth of analysis and sufficient commitment
- Project does not crowd-out economic policy analysis
- Credibility of the project participants in the partner country
- Analysis is sound and credible with clear benefits
- Policy analysis is relevant to the circumstances of the country at that time
- Policy analysis is effectively promoted throughout the appropriate channels
- The project considers Australian capability and comparative advantage
ADP priority countries and funds allocation

- Bangladesh: 7%
- China: 14%
- Fiji: 4%
- India: 13%
- Indonesia: 11%
- Laos: 3%
- Mongolia: 6%
- Nepal: 6%
- Pakistan: 19%
- Vanuatu: 4%
- Vietnam: 13%
- Vietnam: 13%
- Vietnam: 13%
- Vietnam: 13%
- Vietnam: 13%
- Vietnam: 13%
ACIAR/ADP projects in Pakistan

• Policies and institutional reforms to improve horticultural markets in Pakistan (ADP/2014/043)
• Economic analysis of policies affecting pulses (production) in Pakistan (ADP/2016/043)
• Enhancing smallholders performance through interventions and collaborative research: A case study of horticulture in Pakistan (ADP/2016/028)
• Enabling agricultural policies benefitting smallholders in dairy, citrus and mango industries of Pakistan (ADP/2010/091)
• Efficient participatory irrigation institutions to support productive and sustainable agriculture in south Asia (ADP/2014/045)
• Creating wealth in smallholders farms through efficient credit systems in Pakistan (ADP/2016/028)
A lot more to do with great coordination

PIDE and other institutions can play a major role in analyzing policies.
For more information please visit our website:

www.aciar.gov.au

OR

Contact the relevant ACIAR Research Program Manager (details on website)

Thank you