Asian and Pacific Workshop on Whole-Process Mechanization of Potato Production

Status of Potato Production and Whole-Process Mechanization in Nepal

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Chief, National Potato Development Program
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4. Status of Mechanization in Potato Production
5. Need Assessment for Potato Production Mechanization
6. Challenges and Constraints for Whole-Process Potato Production and Mechanization
7. Suggestions for Regional Co-operation
- Land area 147,181 sq km (EW-885 km, NS-193 km)
- Population 26.50 M (CBS, 2011)
- Three geographical region Terai, Hills & Mountains
- Elevation ranges from 70 to 8848 amsl (Mt. Everest)
- Climate temperate to sub tropical
- Rugged terrain and diversity (in all sense) the typical feature
- Potato Cultivation from 70 to 4400 amsl
- 5th crop in area coverage (205,725 ha)
- Total production 2,817,512 mt
- Productivity 13.69 mt/ha
- Consumption 75 kgs/head/annum
- Almost self sufficiency for fresh consumption (88-90% around)
Potato Crop Varieties

- More than 10 varieties released and registered
- Distribution of different varieties in different geographical locations.
  - **Western terai and hills**: Cardinal, Desiree, Khumal white
  - **Central and western Mid hills**: Janakdev
  - **Kaski and Nuwakot districts**: MS 42.3
  - **Hills of Dolakha, Sindhupalchok, Ramechhap districts**: Rozita, Khumal red
  - **Kavre, Bhaktapur and Kathmandu districts**: Cardinal, Desiree, Janakdev
  - **Eastern terai**: Kufri Sindhuri, Cardinal

Season of Potato Growing differs with geographical locations

<table>
<thead>
<tr>
<th>S.n</th>
<th>Season</th>
<th>Planting time</th>
<th>Harvesting time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Winter season</td>
<td>Sept-October</td>
<td>January-Feb</td>
</tr>
<tr>
<td>2</td>
<td>Early Spring</td>
<td>January-February</td>
<td>April-may</td>
</tr>
<tr>
<td>3</td>
<td>Late spring</td>
<td>March-April</td>
<td>June-August</td>
</tr>
<tr>
<td>4</td>
<td>Autumn season</td>
<td>July-August</td>
<td>September-Oct</td>
</tr>
</tbody>
</table>
# Potato Trade

<table>
<thead>
<tr>
<th>SN</th>
<th>Item</th>
<th>Import</th>
<th>Export</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Kg</td>
<td>Values Rs</td>
</tr>
<tr>
<td>1</td>
<td>Potato seeds</td>
<td>141,180</td>
<td>2,419,479</td>
</tr>
<tr>
<td>2</td>
<td>Fresh potatoes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Potatoes fresh or chilled</td>
<td>215,034,005</td>
<td>4,140,642,487</td>
</tr>
<tr>
<td></td>
<td>Potatoes</td>
<td>3,402,117</td>
<td>74,945,545</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>218,436,122</td>
<td>4,215,588,032</td>
</tr>
<tr>
<td>3</td>
<td>Processed potato products</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flour, meal of powder of potatoes</td>
<td>24,900</td>
<td>1,475,408</td>
</tr>
<tr>
<td></td>
<td>Flakes, granules, pellets of potatoes</td>
<td>451,079</td>
<td>31,116,829</td>
</tr>
<tr>
<td></td>
<td>Potato starch</td>
<td>802</td>
<td>42,125</td>
</tr>
<tr>
<td></td>
<td>Potato chips</td>
<td>162,417</td>
<td>88,964,349</td>
</tr>
<tr>
<td></td>
<td>Potatoes prepared or preserved otherwise than by vinegar of acetic acid frozen</td>
<td>160,308</td>
<td>17,064,931</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>799,506</td>
<td>138,663,642</td>
</tr>
</tbody>
</table>

Source: MoAD, 2013-14 (NRs 106 = 1$)
Overview of Potato Supply Chain

Potato Value Chain in Nepal

- Consumption
- Retail trade
- Whole sale trade
- Processing
- Import
- Collection
- Seed/ware potato production
- Input supply
- Function

- Consumers
- Retail traders
- Whole sale traders
- Processors
- Importers/stockists
- Group/Co-operatives
- Farmers
- Agrovets/traders/cold stores
- Tissue culture labs/farms
- Actors

- DFTQC, FNCCI
- FNCCI, MOAD, Fls
- DADO, NARC, DOA, NGOs
- Supporters
Gaps and interventions need

- Increasing productivity
- Use of inputs
  - Irrigation
  - Chemical fertilizer
  - Quality seed
  - Mechanization
- Storage and marketing facilitation
- Trade (Import)
- Climate Change Adaptation
## Status of Mechanization in Potato Production

### General Agricultural Mechanization

#### Households Using Various Machinery/Equipment for the Agricultural Operations

<table>
<thead>
<tr>
<th>Machinery/Equipments used</th>
<th>No of Households</th>
<th>% Households</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron ploughs</td>
<td>1,073,441</td>
<td>28.02</td>
</tr>
<tr>
<td>Tractor &amp; Power tillers</td>
<td>920,371</td>
<td>24.03</td>
</tr>
<tr>
<td>Thresher</td>
<td>803,154</td>
<td>20.96</td>
</tr>
<tr>
<td>Pumping sets</td>
<td>548,203</td>
<td>14.31</td>
</tr>
<tr>
<td>Sprayers</td>
<td>574,014</td>
<td>14.98</td>
</tr>
<tr>
<td>Shallow tubewells</td>
<td>367,744</td>
<td>9.56</td>
</tr>
<tr>
<td>Deep tubewells</td>
<td>159,725</td>
<td>4.17</td>
</tr>
<tr>
<td>Treadle pump (Dhiki)</td>
<td>79,145</td>
<td>2.06</td>
</tr>
<tr>
<td>Animal drawn cart</td>
<td>334,978</td>
<td>8.74</td>
</tr>
<tr>
<td>Other Equipments</td>
<td>290,084</td>
<td>7.57</td>
</tr>
</tbody>
</table>

Source: National Sample Census of Agriculture, CBS, 2012

- Agricultural Mechanization Promotion Policy, 2014, Drafting of Strategy in process
- Agricultural Development Strategy (ADS), 2015, Special section mentioning private sector involvement
- New Constitution of Nepal, 2015 (2072), emphasis for promotion of machinery
- Nepal Agricultural Machinery Entrepreneurs Association (NAMEA) officially registered
## Mechanization in Potato Production

<table>
<thead>
<tr>
<th>Operation</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seed production</td>
<td>4 tissue culture labs (1 in government sector and 3 in private sector); 2 under construction, 6 screen/net house linked for pre-basic seed production. 4 labs proposed for next year in 50% cost bearing basis</td>
</tr>
<tr>
<td>Land Preparation</td>
<td>Almost 75 % is mechanized, 4 wheel tractor driven plough, mold board plough, disc harrow, ridger and cultivator in terai and 2 wheel power tillers and mini tillers driven rotavator, ridger in hills and mountains. Local manufacturers fabricated 2 wheel power tiller drawn ridger.</td>
</tr>
<tr>
<td>Seeding/ Sowing</td>
<td>Few 4 wheel tractor and 2 wheeler driven potato planter are been used and demand is increasing</td>
</tr>
<tr>
<td>Operation</td>
<td>Activities</td>
</tr>
<tr>
<td>--------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Water Management</td>
<td>Electrical, diesel, petrol and some places solar pumps for water lifting. Drip irrigation system and use of sprinklers are increasing in hilly terrain</td>
</tr>
<tr>
<td>Intercultural Operation</td>
<td>Weeding: mostly manually, some hand tools weeder and mechanical weeder are coming in to practice. Pest management: different sprayers &amp; dusters, it is almost 100%.</td>
</tr>
<tr>
<td>Harvesting</td>
<td>Mostly manually, some 4 wheel and 2 wheel tractor driven diggers are in practice in terai area. Local manufacturers started fabricating such attachments.</td>
</tr>
<tr>
<td>Post Harvest</td>
<td>Grading and shorting: manually. Manually operated potato grader has been introduced recently.</td>
</tr>
</tbody>
</table>
## Mechanization in Potato Production

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</thead>
<tbody>
<tr>
<td>Transportation</td>
<td>Transportation from farm/field to collection center or storage is done manually in mountains, by bullock drawn carts and trucks, trailer attached to 4 wheel and 2 wheel tractors in terai and foothills.</td>
</tr>
<tr>
<td>Processing</td>
<td>At least 34 processing factories are producing finger chips, chips and other products</td>
</tr>
<tr>
<td>Storage</td>
<td>• 40 Cold stores are in operation with estimated capacity of 86,400 mt, 50% of the electricity tariff is being subsidized.</td>
</tr>
<tr>
<td></td>
<td>• High altitude areas 10-40 Mt capacity, 171 rustic stores (Natural) with the estimated capacity of 1,710 mt are in proper operation.</td>
</tr>
<tr>
<td></td>
<td>• Government has launched interest subsidy for 5 years for new cold store establishment finance by banks and free in minimum electricity demand charge</td>
</tr>
</tbody>
</table>
Need Assessment

- Commercialization of potato sector / Increased cost of production due to labor shortage
- Demand of good quality virus-free seed potato production
- Adequate infrastructure for good quality seed potato storage
- Demand of Machinery is increasing
- Establish well equipped training and testing center and TOT in machinery
- Educate sufficient mid-level technician for effective mechanization.
- Human resource development for entrepreneurs and cooperatives for custom hiring service.
- Attract young generation with Agricultural Mechanization as prestigious occupation to address agriculture human resources migration.
Challenges and Constraints

- The geographical setting.
- The land fragmentation is increasing.
- Low investment from public and private sector for the mechanization
- Limited access to machineries, spare parts and after-sales services.
- Weak organization setup in the government system. Only 15 agricultural engineer in DoA and 25 in NARC.
- Establishing training and testing center requires huge investment.
- No mid-level manpower production in the country for Agril Engineering.
- Energy supply
- Youth migration to urban and aboard leaving old age and women.
- Credit facility and high interest rates from financial institutions
Suggestions for Regional Co-operation

- Developed countries support to undeveloped/developing countries through scholarship provisions for Capacity enhancement to existing human resources.
- Exchange of new innovations on Agril Mechanization among the member countries of CSAM through strengthening linkages.
- Coordination among the organization/institute involved in Agricultural Mechanization in the SAARC regions.
- Establishment supports for Training and Testing Center.
- Strengthen and expand ANTAM activates throughout the region.
- A regional project for farm machinery research and development, technology generation and validation.
Suggestions for Regional Co-operation

- A regional project to support farmers financially and technically to mechanize their potato farming.
- A regional network of traders to increase access to machineries & spare parts.
- Establishing regional database in agricultural mechanization.
- Regional collaboration in organizing International Expos.
- CSAM continue organizing regional meeting and seminar for coordination and cooperation in area of Agricultural Mechanization.
- Establish network and linkages among agencies and individuals involved in whole-process mechanization of potato production in member countries.
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Thanks for your kind attention