

# Horticultural Research and Development: Need for Functional Collaboration Among Research, Extension and Education (R-E-E) in Nepal

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## Abstract

Nepal holds immense potential in producing horticultural crops, however, this advantage hasn't been utilized to its optimum level. The overall growth of horticulture sector depends on the efficient delivery of developed technologies and functional coordination among the actors involved in the sector. This article focuses on reviewing the present status of coordination and the need of functional collaboration among the actors involved in research, extension and education (REE) of Horticulture sector in Nepal. Horticultural education and research functions are undertaken by the Agriculture Universities and Institutes in Nepal. Nepal Agricultural Research Council (NARC) is mainly involved in research function. The Department of Agriculture (DoA) through its Horticultural Farms and other organizations provide extension services. In the present context of three-tier government system in Nepal, few Horticultural Farms including Agriculture Knowledge Centers under provincial government and Agriculture Section under local government are providing horticulture extension services to the farmers. However, the institutions involved in different aspects of REE are working independently without significant functional coordination and collaboration. A poor linkages among the institutions working the field of research, extension and education of Horticulture sector is the most crucial institutional problem for overall growth of this sector in Nepal. Vertical and horizontal collaboration and coordination among different stakeholders working in the field of REE will help to boost the horticultural development in Nepal.

**Keywords:** Horticulture development, REE, Policy gap

## 1. BACKGROUND

Nepal has wide range of agro-ecological zones which favor immense opportunities for the growth of different types of fruits, vegetables, plantation crops, spices, ornamental, medicinal and aromatic plants. Horticultural crops are grown all over the country and its distribution is more common in the hills and the mountains. Most of the horticultural crops are high value commodities, and are mostly commercialized, thus these are important sources of income and nutritional source to Nepalese people (Thapa et al. 2019). The contribution of the horticultural crops in agriculture gross domestic products (AGDP) is 38.59%, where vegetable sector shares 20.48%, potato 10.51%, fruits 5.13% and spice crops 2.37% (MoALD, 2017/18). Horticultural crops are considered in the top position in regard to its commercialization, value addition, export promotion, import substitution, employment and income generation.

The main factors behind the poor growth of horticulture sector might be due to lack of availability of technologies or less accessibility of the farmers to the appropriate technologies. Several institutions in Nepal are working in the generation of Horticulture related technologies. Among these institutions Nepal Agricultural Research Council (NARC) is mainly involved in technology generation (research). The academic institutions such as Institute of Agriculture and Animal Sciences (IAAS) under the Tribhuvan University (TU), Agriculture and Forestry University (AFU), Purbanchal University and Far Western University are mainly involved on education and research.

Department of Agriculture (DoA) under MoALD has been involving in technology dissemination to the end users at central level. The horticulture farms under DoA and provincial governments

have been involving in providing extension services and also producing and selling seed/saplings of horticultural crops. In the present context of three-tier government system, Agriculture Knowledge Centers (AKCs) and some of the horticulture farms under Agriculture Development Directorate (ADD) in the provincial level and Agriculture Section at local level providing extension services in horticulture sector. Moreover, the zones and super zones under Prime Minister Agriculture Modernization Project are also working on horticultural technology delivery in Nepal.

Agricultural (Horticultural) Education in Nepal is mainly undertaken by Institute of Agriculture and Animal Science (IAAS) under Tribhuvan University (TU), Agriculture and Forestry University (AFU), Purbanchal University (PU), Far Western University (FWU) and Council of Technical Education and Vocational Training (CTEVT). However, these agriculture educational institutions are under Ministry of Education and have no direct linkage with Ministry of Agriculture and Livestock Development resulting in poor coordination with agricultural extension and research system (Kaini, 2019).

## 2. Status of Horticultural Research, Extension and Education

Agricultural research, extension and education are interdependent institutions but currently these are operated independently in Nepal. Bridging the gap between research and extension for strengthening their linkages is the most serious issues in designing research and extension program in Nepal (Timsina et al, 2018). The organizations working in horticultural sector in different tiers of Nepal are presented below (fig. 1, 2 & 3):

## 2.1 Organizations

### (A) Federal Government

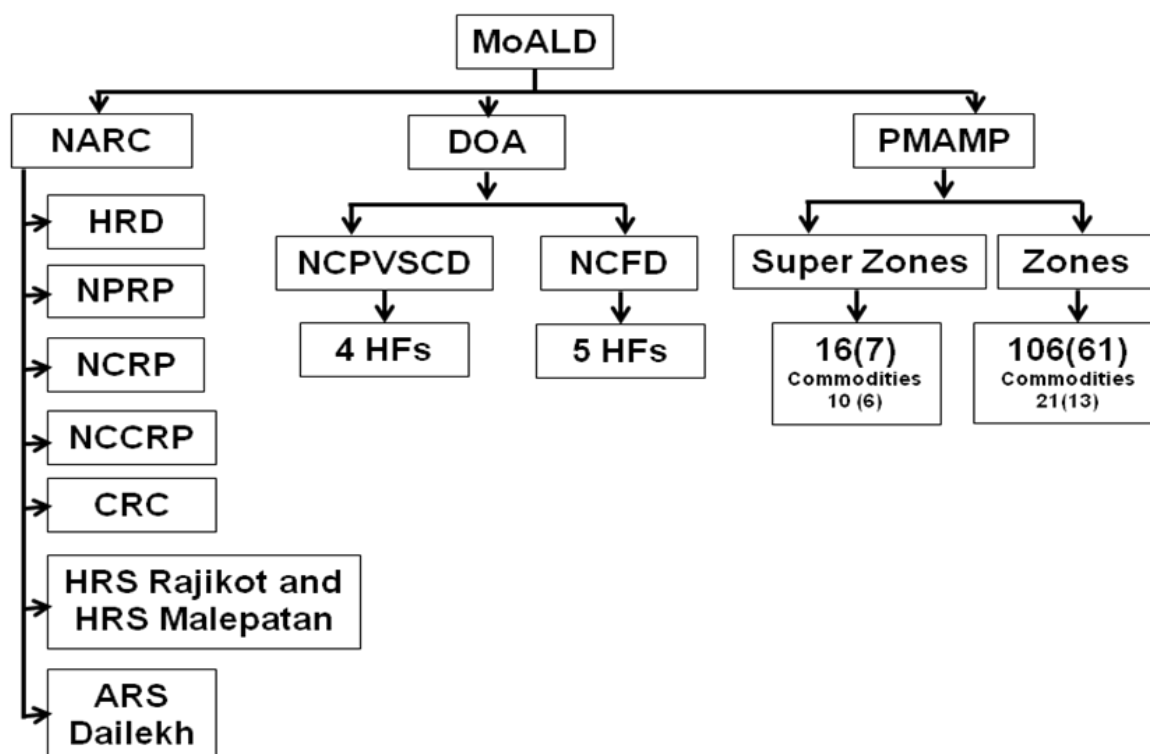


Fig. 1: Central level government organizations in horticulture sector (MoALD: Ministry of Agriculture and Livestock Development, NARC: Nepal Agricultural Research Council, DoA: Department of Agriculture, PMAMP: Prime Ministers Agriculture Modernization Project, HRD: Horticulture Research Division, NPRP: National Potato Research Program, NCRP: National Citrus Research Program, NCCRP: National Commercial Crops Research Program, CRC: Coffee Research Centre, HRS: Horticulture Research Station, ARS: Agriculture Research Station, NPVSCD: National Centre for Potato, Vegetable and Spice Crop Development, NCFD: National Centre for Fruit Development, HF: Horticulture Farm)

### (B) Provincial Government

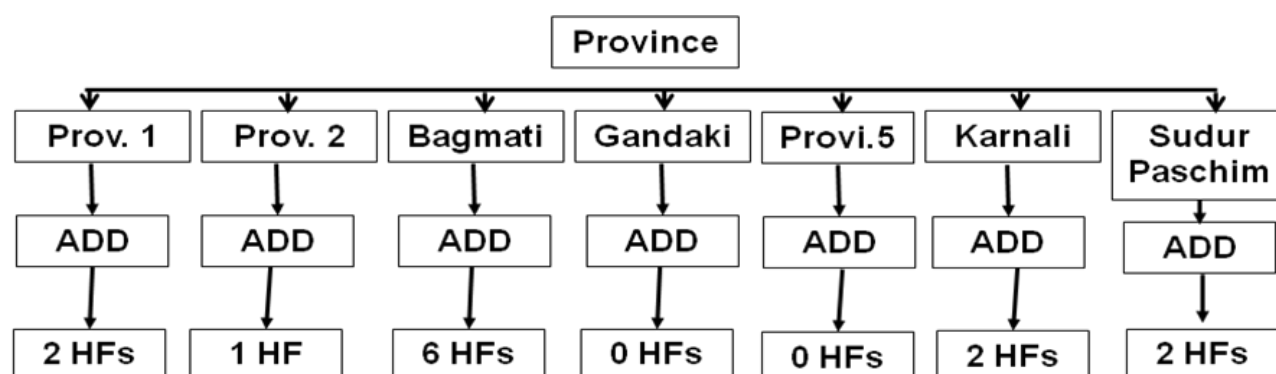
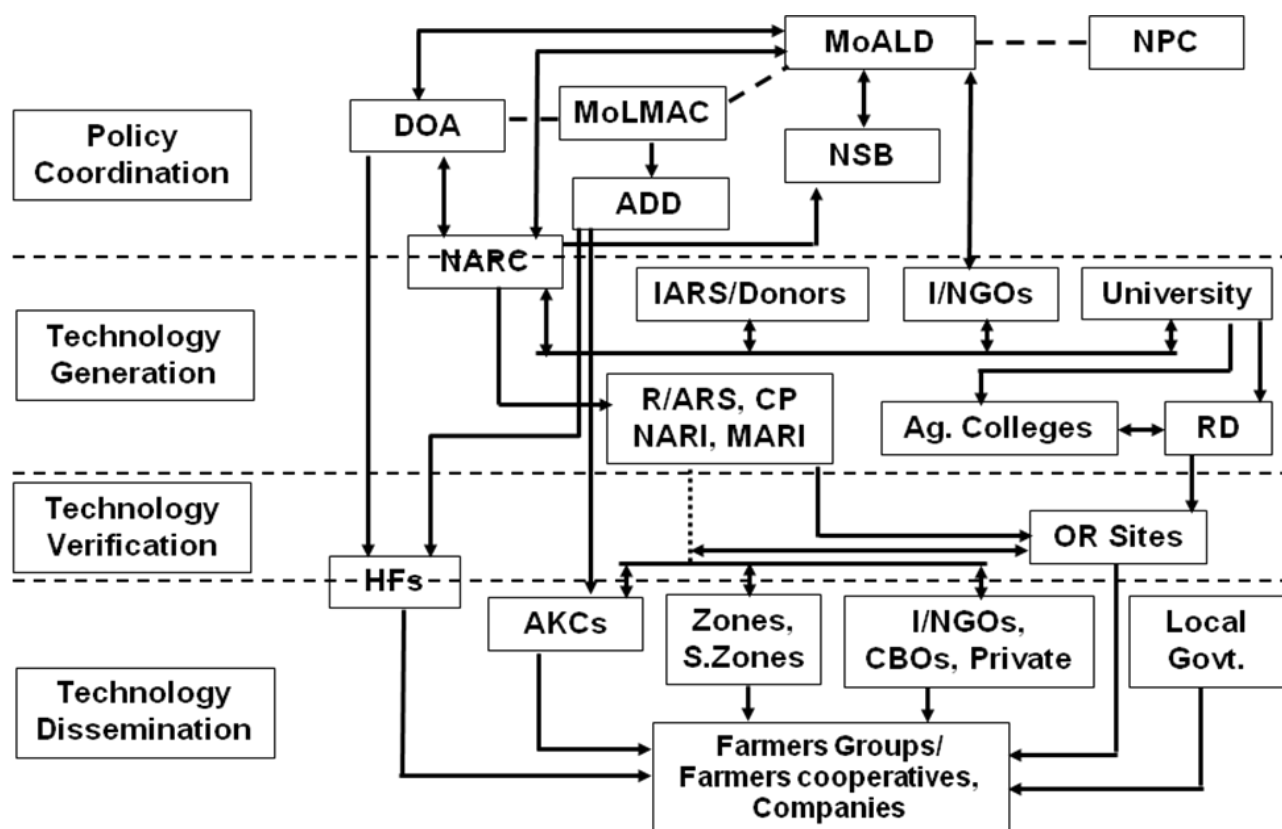


Fig. 2: Provincial level government organizations in horticulture sector (ADD: Agriculture Development Directorate, Prov.: Province, HF: Horticulture farms)

## 2.2 Framework of Organizations



**Fig. 3:** Framework of organizations in Horticulture Sector (NPC: National Planning Commission, MoLMAC: Ministry of Land Management, Agriculture and Co-operatives, NSB: National Seed Board, RD: Respective departments, CP: Commodity Programs, NARI: National Agriculture Research Institute, MARI: Mountain Agriculture research Institute, OR: Outreach Research, AKC: Agriculture Knowledge Centre). Source: Adopted from Timsina et al., 2016 and updated.

## 2.3 Existing Coordination Mechanisms

The following mechanisms are in practice for the co-ordination and collaboration of agriculture development in Nepal:

- Participation of Executive Director of NARC and Director General of DoA in National-level Technical Working Group (NATWG) meeting
- REE meeting at Ministry of Agriculture at central (state government) level
- Participation of representatives of NARC and DoA in periodic meetings organized by these institutions
- Involvement of Dean of TU/IAAS as a council member of NARC
- Executive Director of NARC is member

of the faculty board of IAAS

- Intern students are mobilized in NARC, DoA and PMAMP

## 3. Possible Areas of functional collaborations in REE system in Nepal

The reasons behind low productivity of horticultural crops are-poorly availability of appropriate technology, and technology transfer system due to lack of mandatory coordination between research, extension and education. The 20 years visionary plan Agriculture Development Strategy (ADS) has emphasized to build a strong functional coordination among these institutions. Agricultural Research,

Extension and Education (REE) collaboration enrichment through government, universities, non-governmental and private sectors is increasing. However, due to poor linkage between stakeholders expected result has not been achieved.

Department of agriculture has proposed a new directive for coordination among the institutions involved in REE sector. The new directive has provisioned different committees like Direction Committee, Coordination Committee and Coordination Desk. Likewise, TU/IAAS and AFU has already established a help desk along with a focal person. Similarly, NARC regularly organizes technical working group meetings at

provincial and national level (i.e. PATWG and NATWG).

The Constitution of Nepal has provisioned three tier of government along with the authority over different elements of agriculture. Under these circumstances a high level of horizontal and vertical coordination is required. Horizontal coordination is required among agriculture related ministries. Research Institutes under DoAR (proposed) should be engaged in policy coordination, technology generation, technology verification and dissemination.

The areas of functional collaboration among/ between the institutions working in the field of REE are presented in table 1.

<b>Table 1: Possible areas of collaboration among/between the institutions involved in REE</b>		
<b>Extension ↔ Education</b>	<b>Extension ↔ Research</b>	<b>Research ↔ Education</b>
<ul style="list-style-type: none"> <li>• Curriculum development in the Universities</li> <li>• Research need identification</li> <li>• Human resource demand and development</li> <li>• Policy input</li> <li>• Resource sharing (Manpower + Physical facilities)</li> </ul>	<ul style="list-style-type: none"> <li>• Research need identification</li> <li>• Priority selection and project development</li> <li>• Policy inputs</li> <li>• Technology verification at field level</li> <li>• Information sharing and feedback</li> <li>• Resource sharing (Manpower + Physical facilities)</li> </ul>	<ul style="list-style-type: none"> <li>• Research priorities identification</li> <li>• Research policies setting</li> <li>• Collaboration in technology generation</li> <li>• Human resource demand and supply</li> <li>• Knowledge/Information exchange</li> <li>• Resource sharing (Manpower + Physical facilities)</li> </ul>

## 4. Major Issues

Nepal is poorly benefitting as a member of World Trade Organization (WTO) because the export is very low. Export possibility with horticultural commodities is comparatively higher than other crops. Sector wise programs need to be formulated based on agricultural research policy and implementation responsibility should be given to the team of multidisciplinary researchers. Nepal is following vertical technology transfer system i.e. research to extension and finally to the users.

### 4.1 Research

- Very weak institutional setup for Horticultural Research
- Divided research facilities among organizations
- Duplication of work and resources
- Changed political system (Centralized to Federal)
- Addressing unique characteristics of horticultural crops
- Generation of demand driven technologies

- Short Supply and availability of technical services: seeds, saplings, trainings
- Inadequate human resources
- Budget and research priorities
- Weak Scientific Expertise Development due to frequent transfer of scientists)
- Low retention of scientists in the job
- ❖ Strengthening R-E-E Desk in MoALD, MoLMAC, NARC, Universities, CTEVT
  - Focal points bimonthly meeting
- ❖ Knowledge and information sharing and feedback workshops at Central and Province level
  - Yearly basis

## 4.2 Extension

- Disturbed technical linkages among extension organizations in three-tier of government
- Poor co-ordination among the organizations
- Flow of invalidated technologies (saplings/ seeds etc.) from informal sources
- Limited number of experts (lack of technical expertise)
- Less number of farms
- Less production of quality inputs (seed/ saplings)
- ❖ Joint planning workshops among the institutions working in the field of REE
  - At least once a year
- ❖ National Horticulture Workshop
  - Yearly basis
- ❖ International Horticulture Workshop
  - 3 years interval
- ❖ Technology validation/certification committee in the leadership of NARC
- ❖ Formation of Horticulture Thematic Working Group (Nepal Horticulture Society, NCFD/ NCPVSD/ CPs/ HRD/ Prime Minister Agricultural Modernization Project and Universities)
  - Regular technical meeting

## 4.3 Education

- Updating the curriculum regularly
- Education quality control (numerous colleges emerged)
- Less research and extension focus
- Less research for policy inputs
- Inadequate quality manpower
- ❖ Formation of Outreach Research coordination committee at Local/district level (R+E+E+Farmers)
  - Extension of outreach sites
- ❖ Farm/centers linked with research institutes (technology verification/ validation) and education (intern and thesis)
  - Intern mobilization and research works

## 5. Mechanism of R-E-E

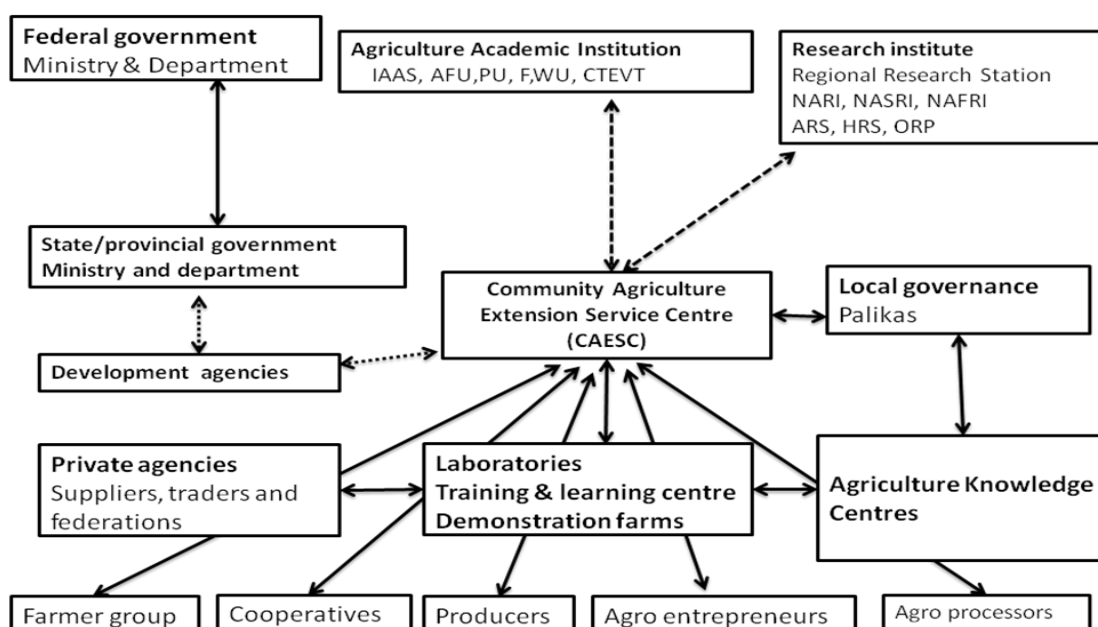
The following mechanisms are proposed for further strengthening of functional co-ordination and collaboration in horticultural sector in Nepal.

- ❖ Organization of R-E-E coordination and direction committee at Central level
  - Half yearly meeting
- ❖ Construction of R-E-E coordination committee at Provincial level
  - Organize at least quarterly meeting
- ❖ Specialist/knowledge exchange among the institutions involved in R-E-E
- ❖ Student mobilization at NARC/DoA/AKC/ PMAMP and other projects
- ❖ Establish common out-reach research (technology verification and dissemination) sites at each local level government unit/municipality and work jointly in collaboration with research, extension, and educational institutes.
- ❖ All the farm stations whether they belong to federal or provincial government or NARC

- ❖ must carry out researches on pertaining issues of specific crops and demonstrate results throughout research sites.
- ❖ Establish National Research Coordination Committee under the chairmanship of Secretary, MoALD as an apex body to formulate research policies and provide research grant to research institutes.
- ❖ Establish an easy access to M. Sc. and PhD agriculture students to conduct their researches in NARC and other government farms for their partial fulfillment of degree.
- ❖ Address the need for modality or a system for professional growth within the

organization.

- ❖ Develop extension system as participatory, bottom up approach and demand driven.
- ❖ Adopt pluralistic research and extension approach.
- The Community Agricultural Extension Service Centers (CAESC) model envisioned by ADS (2015-2035) is the most interesting platform could be built and is required the greatest changes how we think about the CAESC (fig. 4). Such a model applies particularly well to extension at its best though extension itself needs to change fully to utilize it (Jaishi & Parajuli, 2018).



**Fig. 4:** CAESC based REE linkage for Nepal as envisioned by ADS

Community based agriculture transformation model in close association with local, state and federal governance could be designed for inclusive considering Nepalese geography, natural, human, economic resources. The Constitution of Nepal (2015) and Local Government Operation Act (2017) opened such opportunity to make partnership with collaboration and cooperation between these institutions to make REE effective and efficient.

## 6. CONCLUSION

Strengthening linkage between horticulture research, extension and education has not

received priority in policy implementation and funding so far. It is felt that there is a poor linkage between research, extension and education as functions are carried out in isolation by different organizations. The study shows that the mechanism for linkages between extension and research exists but the effective functioning of these at different level requires more coordinated efforts. There is a poor functional linkage between REE institutions. There is no single window to govern and coordinate REE functions. REE interface has been much talked about but poorly executed. Such mechanisms

are rather more formal than functional. There is absolute need for vertical and

horizontal linkage and coordination between research, extension and

education system at central, provincial, and local level. It is high time that strong linkage and interface mechanism and arrangement are to be established.

## 7. WAY FORWARD

- Technical linkages should be maintained among the organizations of three-tiers of government to execute the program.
- Agriculture Council should be formed to regulate educational quality.
- National Horticulture Research Institute (NHRI) should be created under NARC as envisaged by ADS.
- Engagement of NARC and other research organizations in PMAMP zones and super zones should be strengthened.
- Research priorities should be defined according to the needs of users in co-ordination of concern stakeholders.
- Specialists should be exchanged amongst research, extension and education institutions.
- Technology validation /certification committee should be formed under the leadership of NARC to validate the research done by different institutions.
- Every institution should have one help desk with focal person to execute the R-E-E functions.
- National level agricultural research, extension and education strategies should be formulated and implemented soon for overall development of horticulture sector in Nepal.

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