HORTICULTURE EDUCATION SYSTEMS IN NEPAL

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ABSTRACT

Nepal has varied agro-ecological regions where enumerable horticultural plant species are available. The commercialization of these crops requires appropriate production techniques based on the soil and climatic situation of Nepal and its various regions. Realizing these facts a need of manpower development in horticulture was felt by the government of Nepal. As a result, horticultural education (as a short-term training) was started in nurseries and gardens as early as 1937 A.D. However, the formal, one year course program was started in 1957 when the School of Agriculture was established. At present, many academic and non-academic institutions have come up for giving horticultural education and developing skilled manpower in this field. Institutions which give academic horticultural education are the Institute of Agriculture and Animal Science of Tribhuvan University (TU), the Faculty of Agriculture of Agriculture and Forestry University (AFU), the Himalayan College of Agricultural Sciences and Technology (HICAST) of Purbanchal University, Mahendra Ratna Multiple Campus, Illam/TU, Gokuleshwor Agriculture College/T, College of Live Science/TU, Prithu Technical College/TU, Nepal Polytechnique Institute, and the Council for Technical Education and Vocational Training (CTEVT) through its technical schools and affiliated colleges. Many of the non-academic institutions which run training courses in horticulture are ATD, FDD, VDD, NARC, NGOs, INGOs, Private Farms and Institutions, etc. This paper presents a brief information about these academic and non-academic institutions along with some recommendations for improving horticultural education.

INTRODUCTION

The agro-ecological conditions of Nepal are very much suitable for the successful cultivation of a large number of horticultural plant species from time immemorial either in a separate area or near a homestead gardens. For the systematic horticultural development in Nepal three aspects such as education, research, and development activities should be focused adequately in a planned manner. The Master Plan for

Horticulture Development in Nepal (MPHD, 1990) and Agriculture Perspective Plan (APP, 1995) have stressed a need for strengthening agricultural and horticultural education, which had been underway since 2014 B.S. (1957 A.D.).

Establishment of educational institutes for production of technical personnel in agricultural sector including horticulture was initiated from 2014 B.S (1957 A.D.) when the School of Agriculture was started at Jagadamba Bhawan to give agricultural trainings to develop low level manpower called Junior Technical Assistant (JTA) (Acharya, 2013; Shrestha, 1998). Later, in 2017 B.S, the school was converted into Jagadamba College of Agriculture and Research Institute in Shrimahal. Again, it was promoted to the Institute of Agriculture and Animal Science (IAAS) in 2029 B.S. under Tribhuvan University (TU). IAAS started to run I. Sc. Ag. Program at Shrimahal. IAAS was transferred from Lalitpur to Rampur, Chitwan in 2030 B.S. (1974 A.D). Since then, IAAS has offered several academic programs in agriculture and horticulture. This paper focuses academic and/or non-academic institutions involved in horticultural education systems in Nepal.

HORTICULTURAL EDUCATION INSTITUTIONS

There are many educational institutes which offer different courses of horticultural sciences to benefit for national economy. Broadly, these are categorized into a) Academic and b) Non-academic institutions. These are briefly described hereunder:

a. Academic Institutions:

Important educational institutions involved in giving agricultural education including horticultural education are dealt briefly hereunder:

Institute of Agriculture And Animal Science (IAAS): Development of Academic Institution for horticultural education in Nepal was started from as early as 1957 (2014 B.S.) when School of agriculture was established in Lalitpur for producing junior technical assistants (J.T.A.). This school was upgraded to College of Agriculture and Research Institute in 1968 (2025 B.S.) and was housed in Shrimahal, Pulchok. Separating the research responsibilities, this institution

was renamed and established as Agriculture College under Ministry of Agriculture in 2027 B.S. which later converted into Institute of Agriculture and Animal Science under Tribhuvan University in 1972 (2029 B.S.). In 1974 (2030 B.S.), the Institute of Agriculture and Animal Science was moved from Shrimahal, Lalitpur to Rampur, Chitwan (Baral, 2012; Shrestha, 1998). Since then, various academic programs such as I.Sc. Ag., 3-years B.Sc. Ag., 1-year B.Sc.Ed, and 4-years B. Sc. Ag. with /without elective courses in horticulture were started. At present, the IAAS runs M. Sc. Ag. and Ph.D. degree programs in several disciplines including horticultural science. Two branch campuses of IAAS located at Sunderbazar, Lamjung and Paklihawa, Rupendehi also offer B. Sc. Ag. degree program with various horticultural courses.

Agriculture and Forestry University (AFU): AFU was established at Rampur, Chitwan, Nepal in June, 2010 (Baral, 2012). This is the first Agriculture and Forestry University in the country. AFU was founded by merging Agriculture Campus, Rampur and Forestry Campus, Hetauda; both these campuses were under Tribhuvan University, Nepal. AFU aims at producing highly skilled human resources required for agriculture and forestry sectors. This university inherits B.Sc. Ag., M.Sc. Ag. and Ph. D. programs in agricultural sciences of Rampur Campus and undergraduate program in forestry of Hetauda Campus. The educational programs are supported by quality research and developmental activities.

Himalayan College Of Agricultural Sciences And Technology (HICAST): The Himalayan college of agricultural sciences and technology is established in 2000 A.D. which started with offering B. Sc.(honours) Ag. The vision or motto of this college is "agricultural revolution through quality education". It is first private college in field of agriculture. This college is affiliated to Purbanchal university, Biratnagar.

HICAST was established with four major objectives: a) to produce academically and practically competent graduates in agriculture, veterinary and related technology, b) provide students with adequate opportunities and new vision to cope with the challenges of the new millennium, c) enhance linkages with national and international institutions, conduct collaborative and participatory research, workshop/training and seminars, and d) develop the college into a centre of academic excellence

to promote sustainable livelihood and mutual respect among the people with diverse ethnic and socio-economic background. HICAST has strong curriculum in agricultural sciences with basic and elective course packages in horticulture. Currently, this academic institution runs several graduate and post-graduate programs such as M. Sc. in Dairy Technology, Meat Technology and Agri-Business Management.

Mahendra Ratna Multiple Campus, Illam/TU : Mahendra Ratna Multiple Campus (MRMC) Illam, the first autonomous campus of Tribhuvan University, by taking the advent of autonomy, has started four-year B. Sc. Program in Horticulture named "Bachelor's of Science in Horticulture and Floriculture Management (B. Sc. in HFM)". The curriculum was approved by the Academic Council of Tribhuvan University, Kirtipur in 2010 A.D. but the program was launched from 2012. The aim of this program was to prepare students for a wide variety of careers, entrepreneurship, exploratory enterprises or continual education in horticultural fields by developing both their technical and interpersonal skills so that its graduates would contribute by large to the development and promotion of the "hill economy" of Nepal and the adjoining regions. In addition, this program focuses on the assess, effectiveness and efficiency of management practices in horticulture and floriculture.

Table 1: Horticultural graduates/graduating students with degrees from B.Sc. Ag. Electives to PhD by academic institutions, 2014

Institutions	B.Sc. Electives	B.Sc. HFM	M.Sc. Hort	PhD	Total
AF/AFU1	----	----	(20)	(2)	22
IAAS/TU1	300+	----	100	4 + (2)	406
HICAST/ PU2	99 + (14)				113
MRMC/TU3	----	(88)	----	----	88
Total No.	413	88	120	8	629

Source: Personal communications with: 1Prof. Dr. D. R. Baral, Dean of Agriculture Faculty 2Bishnu Bhattarai, Coordinator of Agriculture program, and 3Bikash Khanal, Lecturer of MRMC Campus, Illam. Figures in parenthesis are graduating in near future.

Nepal Polytechnic Institute (NPI): Established in 1996 at Bharatpur, Chitwan, Nepal Polytechnic Institute (NPI) is the first public limited company of its kind registered under Nepal Company Act,2021 B.S. and Nepal Industrial Act, 2049 BS. The institute was established mainly to produce low to high level human resources in the areas of natural resource management, engineering, environment, management and medicine within a single umbrella so that coordinated efforts could be made to produce quality human resources trained in different disciplines. Offered degree programs in agriculture with horticultural courses are 4-year B. Sc (Hons.) Ag. and I.Sc. Ag. These programs are affiliated to TU .

Gokuleshwor Agriculture And Animal Science College (GAASC) : Gokuleshwor Agriculture and Animal Science College (GAASC) was established in 2013 A.D. and lies in Gokuleshwor VDC of Baitadi district in Far–Western Development Region of Nepal . It is located at nearly 300 meters above mean sea level in the beautiful tiny valley of Gokuleshwor on the bank of Chameliya river. It is the first college to get affiliation from Tribhuvan University to run B.Sc. (Agriculture) program. The college uses the premises of Shree Setigaun Higher Secondary School, Kakarpakha, Gokuleshwor, Baitadi at present, but it has started building its own infrastructures. The establishment of the college became only possible after a long and collaborative effort of local intellectuals, politicians and civil society. This institution follows the curricula of IAAS.

College of Live Sciences (CLS): This college is established at Tulsipur, Dang in 2014 aiming to run various academic degrees in the field of agriculture, veterinary, forestry, dental, tissue culture, and microbiology. Currently CLS runs B.Sc. degree in agriculture. This degree is affiliated with IAAS/TU and it is a 4-year program. The intake policy, course structures and examination activities are as defined by IAAS/TU. In this agriculture program, horticulture courses on fundamentals, fruits, vegetables, ornamentals, post-harvest of produces are dealt as per curriculum defined by IAAS/TU.

Prithu Technical College (PTC): Established at Lamahi of Dang district in 2014, the PTC also runs various academic courses in

the field of four-year B.Sc. agriculture degree program at present. In this agriculture program, horticulture courses on fundamentals, fruits, vegetables, ornamentals, post-harvest of produces are dealt as per curriculum structures defined by IAAS/TU. This college follows all the intake procedures, course structures and examination activities as governed by the policy and regulations of IAAS/TU.

Council of Technical Education And Vocational Training (CTEVT): CTEVT through its constituted and other affiliated schools runs various technical courses including agriculture in different levels (diploma, proficiency certificate, or TSLC level). The duration for TSLC level programs varied from 15 months (for SLC graduates) to 29 months (for under SLC intakes). By the end of December, 2010 the total enrolment under CTEVT schools (managed as well as affiliated) was 8403 at diploma level and 10332 at TSLC level. Two programs of CTEVT in agriculture with various courses in horticulture are 1. Technical School Leaving Certificate in Agriculture (pre SLC program) and 2. Intermediate of Science in Agriculture (diploma in plant science).

Department of Education: Recently, the Government of Nepal through Department of Education in joint collaboration with CTEVT has started agricultural education program called "Technical and Vocational Education for Schools" which intends to give agricultural education in plant science. In this program horticulture stands as a major component. This education is given to the students of grade 9 and grade 10 at school levels in different districts.

b. Non-Academic Institutions:

In Nepal, horticultural education is also given by several non-academia of government, semi-government, non-government and international non-government organizations which offer courses of various nature for specific duration ranging from a few days to several weeks or months. Some of these institutions are briefly described:

Fruit Development Directorate (FDD): It was first established as Horticulture Section in 1955 A.D., which evolved as Fruit Development Section in 1966, Fruit Development Division in 1990 and as the Directorate in 2000 A.D. FDD is the central body responsible for the

development of fruits, coffee, tea and ornamental crops in the country.

FDD, Kirtipur conducts need-based trainings to farmers in different emerging fruits like kiwi, pomegranate, olive, persimmon, citrus and other fruits; the trainings include in different activities from their cultivation practices to harvesting and postharvest management, which lasts for a duration of 7 to 10 days. Other centres of FDD located at different districts also conduct trainings in relevant issues in their command areas.

Agriculture Training Directorate (ATD): This organization is exclusively mandated for training based on specific curricula developed for training in agriculture, including horticulture for different levels from farmers to officer levels. To cite a few examples are: a) training for gazetted third class agricultural officers on "disease and pest management in mandarin orange", b) training for progressive farmers on " fruit nursery and garden management for subtropical and citrus fruit" and "general nursery management and postharvest technology", c) for progressive farmers "training for fruit nursery owner", "citrus fruit propagation and nursery management", "temperate fruit cultivation", "banana cultivation through improved technology" , "fruit orchard management and production technology for Terai" and "temperate fruit production technology and postharvest management", etc.

Table 2: Various trainings on agriculture, including horticultural crop commodities given by the Training Directorate and its Regional Offices in F.Y. 2068/69 B.S. (ATD, 2012)

Training level	Training Number	Total Trainees
Officer level	10	204
JT/JTA level	25	413
Progressive farmers	36	595
Total Number	71	1212

Nepal Agricultural Research Council: Nepal Agricultural Research Council (NARC) was established in 1991 as an autonomous organization under "Nepal Agricultural Research Council Act - 1991" to conduct agricultural research in the country to uplift the economic level of the people. To conduct research related to horticulture it has

a separate Horticulture Research Division(HRD). It is one of the disciplinary division under National Agriculture Research Institute (NARI) of the NARC. Although NARC has exclusively mandated for research it also conducts some training to farmers, technicians, and others on various problem-solving issues of crops including annual and perennial horticultural crops but the curricula is not pre-scheduled by NARC. Almost all research stations having mandates in horticulture and located in different districts have training activities on horticultural aspects for various durations that focus on problem-solving issues in horticulture.

International Centre For Integrated Mountain Development (ICIMOD): ICIMOD is a regional intergovernmental learning and knowledge sharing centre and is based in Kathmandu, Nepal. Globalization and climate change have an increasing influence on the stability of fragile mountain ecosystems and the livelihoods of mountain people. ICIMOD aims to assist mountain people to understand these changes, adapt to them, and make the most use of new opportunities, while addressing upstream-downstream issues. ICIMOD strengthens networking among regional and global centres of excellence to develop an economically and environmentally sound mountain ecosystem to improve the living standards of mountain populations, yet sustaining vital ecosystem services for the present and for the future. This institute has established model farms for horticultural /perennial plant species including fruits, nuts, spices, and vine crops since 1993. As per the demand of farmers and other stakeholders ICIMOD also conducts some trainings on kiwi, lapsi, and others although such trainings do not fall within its objectives.

Private Organizations/Farms, NGOs and INGOs : In Nepal, there are several private organizations, NGOs and INGOs established in different parts of the country and they have their activities on horticultural crop production, promotion, development and research. These agencies also conduct short-term educational activities in horticulture, especially field-based training for developing skills on problem-focused issues of fruits, vegetables, ornamentals as well as plantation and spice crops. Usually, these educations are short durations ranging from less than one

week to period not exceeding four weeks. Hellen Keller International, Education for Livelihood, Care Nepal, Plan International, LIBIRD, AAA, etc. are some examples to cite.

Other Institutions: There are many other institutions that are directly or indirectly involved in giving horticultural education through trainings and hands-on practice. Some examples are Horticulture Development Projects/Department of Agriculture, Central Department of Botany/T. U., Botanical Enterprises Pvt. Ltd. , Nepal Biotech Nursery, Microplants Nepal Pvt. Ltd., Green Research and Technology, Himalayan Botanical Research Centre, Department of Plant Resources, etc. These institutions work on micro-grafting, tissue culture and in-vitro propagation of horticultural plants such as apple, junar, banana, medicinal and aromatic crops, chrysanthemum, gerbera, gladiolus, African violet, lily, orchids, large cardamom, etc. Some or many of these institutions provide tissue culture training for entrepreneurs, farmers, students and researchers as and when needed.

CONCLUSION AND RECOMMENDATIONS

Although many institutions have emerged to contribute their roles in horticultural education systems in Nepal but specific organization which offers particular degree in horticulture is only a few to list. MRMC/TU of Illam has particular academic graduate program in horticulture. In his book entitled "Fruit Development in Nepal", Shrestha (1998) envisaged a need of Horticulture college and Agricultural University almost 2 decades back. Recently, an Agriculture (+ Forestry) University has been established only in 2010 A.D. (Baral, 2012). Under this university, a College of Horticulture should be established with strong academic programs inclusive of various courses and research objectives. For efficient and effective programs to launch quality education in horticulture it is necessary that such institutions be free from political turmoil as observed in academic institutions lately. Also, brain drain of horticultural graduates has been observed in recent years which must be minimized as far as possible by the government of Nepal giving due responsibilities and opportunities to the educated horticultural graduates within Nepal.

There is lack of national policy in horticultural education in Nepal. Within each of the academic institutions, strengthening of faculty members in various but new disciplines are urgently needed and such need was also suggested for IAAS by Dhakal (2001). Also, most of the institutions lack in sufficient infrastructures or they are in need of repairing; thus, timely attention of concerned authorities is a basic need for promoting horticultural education. Similarly, proper coordination, cooperation and collaboration among different institutions and stakeholders involved in teaching, research, and developmental activities are in great need.

Specific curriculum should be developed based on commercial value and entrepreneurships of each horticultural commodity, such as citrus, apple, mango, banana, coffee, cardamom, tomato, potato, etc. However, essential considerations should be given for proper regulation of educational institutions, development of appropriate curricula and their implementation, and proper monitoring mechanisms. Efficient management of Government-owned institutions, semi-governmental and non-governmental institutions should help promote horticultural education in future.

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