

Horticulture Development in Gandaki Province

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Abstract

Agriculture and forest is the 4th priority sector of the total provincial investment as set by province planning commission. Occupying the third largest area and sixth largest population of the country, Gandaki province provides a hope of prosperous agriculture and tourism. Horticulture has great scope while analyzing from the current production figures of the major commodities and the supporting ambitious programs launched from provincial government in spite of fewer technical manpower. As this province's geography is mostly hilly and mountainous, the citrus production is ranked first (approx 23%) followed by winter fruit (15 %) and summer fruits (5%) in this state of Nepal. The major vegetable crops cultivated area is 47508 ha (rank 5th) produces around 558950 mt (8 %) annually. The ginger production rank 2nd with 44992 mt production. Gandaki province covers 34 percent (909 ha) area with 31 percent (166 mt) green bean coffee production. Nationwide the Gandaki province is number one with 47,926 mt in mandarin fruit production. Tissue culture & processing centers, screen & store houses, apple saplings distribution and others are the major horticultural programs of the fiscal year 2019/20. PMAMP blocks and pockets cover much area in some major commodities like mandarin, vegetables, potato, large cardamom, etc. Ministry of Land Management, Agriculture and Cooperative is the apex organization under which Agriculture Development Directorate (ADD) and offices under ADD implement agricultural programs.

1. BACKGROUND

Gandaki Province extends between 27°26'15" North to 29°12'01" N latitude and 82° 52'45" E to 85° 12'01" E longitude located at the middle of Nepal bordering both India (South) and China (North). Pokhara a metropolitan city is the provincial headquarter and stands as the tourist capital of Nepal. The province is observed to be economically viable since it can contribute

in rural livelihood through promotion of tourism, hydropower projects and horticulture.

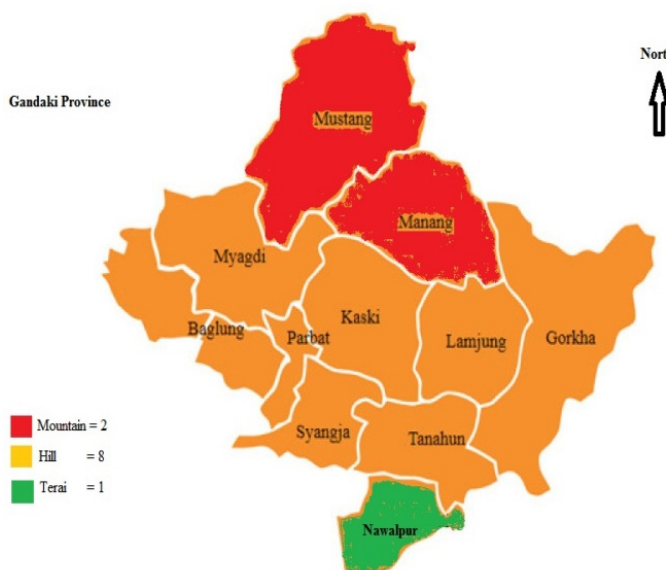
In terms of terrain, the province area (21974km² ~14.88%), is the third largest and spread over the Himalayan (5,809 km² ~ 26.41%), hilly (14,744 km² ~ 67.1%) and Terai (1,426 km² ~6.49%) region of Nepal (MoEAP, 2075). Among the total land 255651 ha land is cultivable and only 117315 Ha (45.8 %) is irrigated (MoF 2019).

37.8 % land is covered under forest (PPC, 2076).

The total GDP, at the producers' price of Nepal is NRS 3464.31 billion, and the contribution of Gandaki Province in national GDP is estimated about NRs 288.207 billion (5th highest = 8.37%). The contribution of agriculture sector (agriculture and forest) of Nepal is estimated to be 811.347 billion, contribution of Gandaki Province is estimated 85.191 Billion (5th highest). The contribution of agriculture sector to GDP was estimated to be 26.98 percent in FY 2018/19 which was less than the fiscal year 2017/18 (MoF 2019).

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The population of this province is 2,403,757 (9.1 % i.e. rank 6th) of the total population of Nepal (Table 1). Total household number is 577,682. Life expectancy of this province is 71 years (rank 1st) as compared to the national average (67 years). Literacy rate of Gandaki province is 74.8 percent (CBS, 2068). Per capita income of this province is 1429 dollar (MoEAP, 2075). Total local governments in Gandaki province are 85 municipalities with 759 wards.

Table 1 Area and population distribution in eleven districts of Gandaki province

S.N	District	Area	Population	Municipality	
		Square Kilometer	(Census 2011)	Urban	Rural
1	Gorkha	3646.00	271061	2	9
2	Mustang	3563.00	13452		5
3	Manang	2321.00	6538		4
4	Myagdi	2285.00	113641	1	5
5	Kaski	2084.00	492098	1	4
6	Baglung	1836.00	268613	4	6
7	Lamjung	1662.00	167724	4	4
8	Tanahu	1572.00	323288	4	6
9	Nawalpur	1426.00	311604	4	4
10	Syangja	1037.00	289148	5	6
11	Parbat	542.00	146590	2	5
Total	21974.00	2403757	27	58	

Total farmer households are 417,523 (72.4 %) where 1864196 individuals are involved in agriculture as a profession. Among the agriculture households 86 percent have major source of income from agriculture (2068, CBS).

PLANS AND PROGRAMS

First five year plan 2076-77 to 2080-81

First five year plan approach paper of Gandaki has been prepared to achieve the boarder objective of fifteen five year plan basic paper of Government of Nepal. Agriculture and forest sector constitute 8.54 percent and is the 4th priority sector of the total provincial investment (approx. NRs 1012.24 billion) projection from 2076/77 to 2080/81 (PPC, 2075). Approach paper of five year plan of province has long term vision, target and objectives in agriculture.

Vision: Guarantee of food security and food sovereignty and self-reliant agriculture in province. Goal: Import substitution with increasing production and productivity by means of mechanization, industrialization, and commercialization in agriculture. Objectives: 1. Becoming self-reliant state by high agriculture production and productivity, 2. Transformation of agriculture into profitable, qualitative as well as into sustainable and commercial system, 3. Development of industry and entrepreneurship for income and employment generation, 4. Making environment friendly agriculture production, and 5. Connecting agriculture into tourism for employment generation and poverty alleviation. Gandaki has different strategies and action plans to achieve these objectives which are not mentioned here. There are three implementation models of programs such as 1. Programs implemented by the Gandaki province directly, 2. Programs implementation in coordination with the local bodies, and 3. Programs implementation in coordination with the Nepal government.

EXPECTED RESULTS

Agriculture friendly policy, acts and regulations will be formulated at the end of the planning

period. Productivity of the cereal crops will be doubled after implementing such programs. Agro-based industries will be established in some river basins (Marsangdi, Chaepae, Daraudi, Kaligandaki, Seti, Madi, Andikhola) and its adjoining areas and hilly basins (Tar) as a pocket after development of irrigation system. At least one cold room, agri-market and collection center in each municipality will be established. 50 thousand extra employment will be generated in agriculture sector. The quality agriculture production materials will be ensured. Value chain activities from production to storage level will be operated for income generation. Connection of agriculture with hotel and tourism sector will be done on contract basis for remarkable import substitution. Climate smart agriculture system will be developed to achieve high production and productivity. Carbon material of soil will be enhanced by 20 % and ultimately this province will be self reliant in agriculture production (PPP, 2076).

MAJOR AGRICULTURAL PRODUCTION STATUS IN YEAR 2017-18

Agronomical crops

Major agronomical crops share of this province: cereals 11 % (rank 5th), total pulses 6% (rank 6th), oil seed 5.36 % (rank 6th), sugarcane 4.79 % (rank 5th) in Nepal. Major cereals crops include paddy (417,928 mt), maize (434,335 mt), millet (100,119 mt), buckwheat (2643 mt) and wheat (94,772 mt), barley (2648 mt) were produced in the Gandaki province. Major pulses include lentil (5937.6 mt), black gram (4857.6 mt), soybean (3297.4 mt), horse gram (852.7 mt), chick pea (280.5 mt), pigeon pea (246.1 mt), grass pea (85.3 mt) and other (5340.5 mt). Major oil seeds include mustards (8983 mt), sarsoon (2070 mt), rayo (533 mt), sunflower (122 mt), sesame (967 mt), groundnut (518 mt), linseed (596 mt), niger (367 mt).

Table 3. Cereals, pulses, oilseed and sugarcane area and production in Gandaki Province

S.N	District	Cereals		Pulses		Oilseed		Sugarcane	
		Area ha	Prod. mt	Area ha	Prod. mt	Area ha	Prod. mt	Area ha	Prod. mt
1	Nawalpur	34544	123128	5155	5807	3933	4490	3668	173490
2	Kaski	59334	151226	896	975	629	527	0	0
3	Syanja	65447	195048	1884	1897	882	804	26	382
4	Baglung	53478	133918	1378	1661	953	890	0	0
5	Tanahu	43463	129924	4046	3680	649	453	45	1057
6	Gorkha	45658	107831	4892	3435	781	740	60	869
7	Lamjung	34111	76010	1517	1439	939	853	20	391
8	Parbat	34586	73590	798	661	386	355	0	0
9	Myagdi	19877	57655	1090	1156	4242	4054	4	166
10	Manang	576	961	165	153	3	2	0	0
11	Mustang	1933	3156	37	35	13	10	0	0
Gandaki		393005.8	393006	1052444	21858	20898	13409	13178	3821
Nepal		3428985.6	3428986	10012742	311382	368741	224595	245867	78609

Source: MoALD, 2017/18.

Among the eleven districts, Nawalpur district stands first in terms of production of agronomical crops (Table 3).

Horticultural crops

Horticultural crops of the Gandaki are coffee, ginger, large cardamom for export purpose and mandarin, banana, apple, potato for import substitution and other yam and tuber crops for addressing the food security of the province. Favorable climate, road connectivity and accessible markets are the major pulling factors to grow horticultural crops for the farmers.

Fruit

Gandaki Province ranks fifth in terms of acreage of fruit cultivation with total area of 18,540 ha (Productive area 11,043 ha) and produces around 10 percent (110273 mt) of the fruit production. The citrus production is ranked first

(approx 23%) followed by winter fruit (15 %) and summer fruits (5%) in this state of Nepal.

Summer fruits

In Gandaki province the summer fruits are cultivated in 5424 ha with productive area of 3346 ha) and it shares around 32.75 percent (36118.6 mt) of the total fruit production area. The summer fruit crop cultivation ranks fifth position in terms of acreage and production as compared with national level data (MoALD, 2018). However, within Gandaki province summer fruits rank second after citrus in terms of acreage and production. Maximum productive area is found in Tanahu and minimum in Manang (MoALD, 2018).

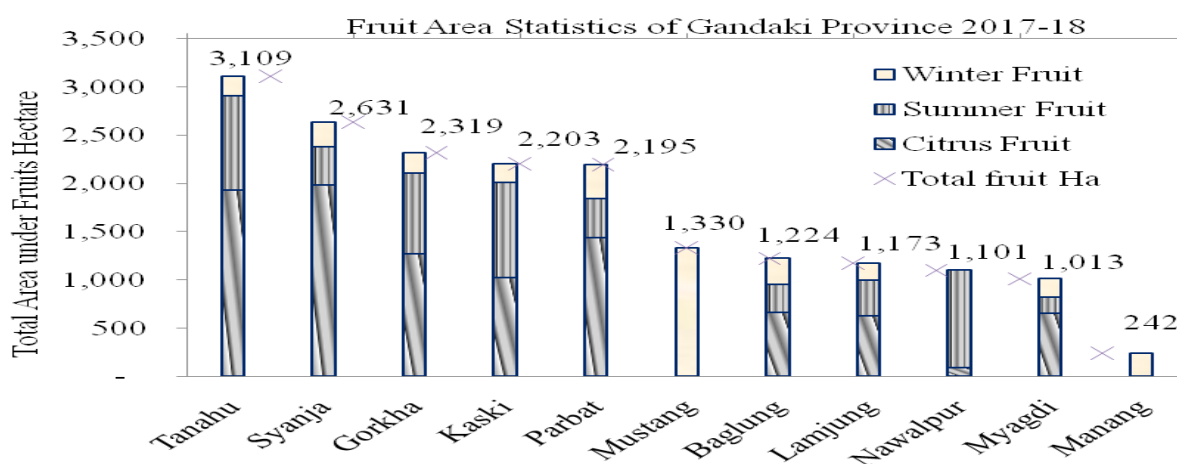


Figure 1. Area of citrus, winter and summer fruit crops in the 11 districts.

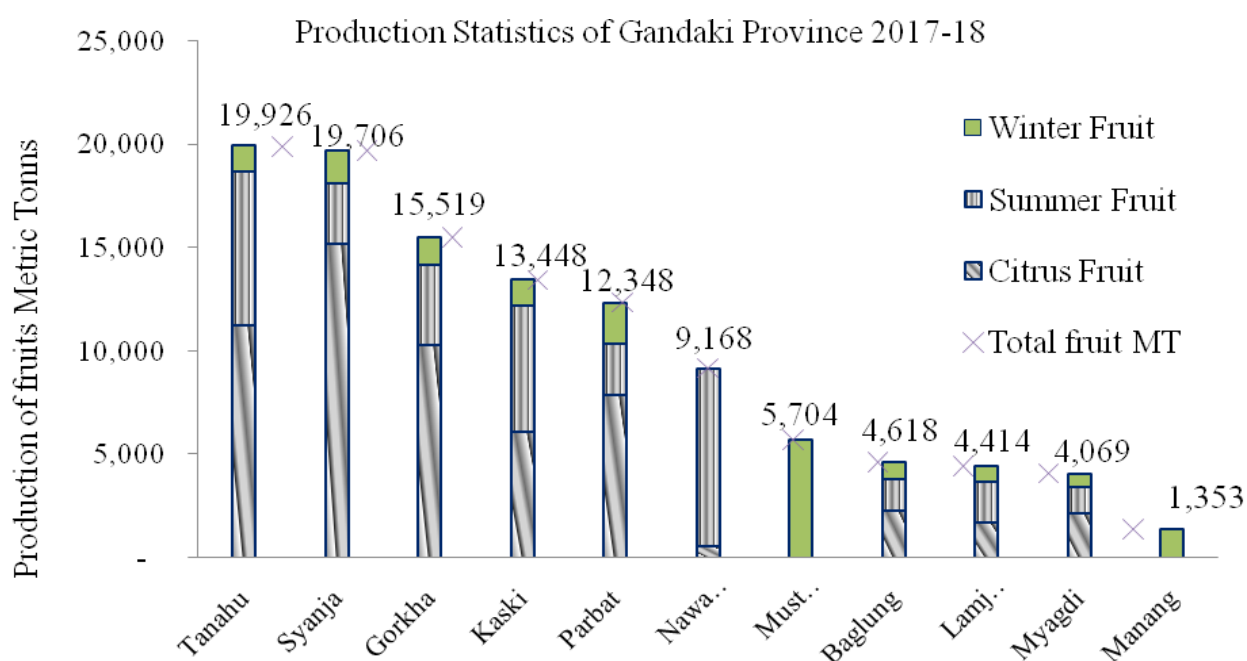


Figure 2. Production figures of citrus, winter and summer fruit crops in the 11 districts.

More than 50 percent of summer fruit production comes from Banana (18556 mt) alone. Others production status are as under : guava (4948 mt~13.70%), mango (3764.427 mt~10.42 %), jackfruit (3184.38 mt~8.81 %), litchi (2527.946 mt~ 6.99%), papaya (1792.914 mt~4.96%) and pineapple (1344.557 mt~ 3.72%) respectively (MoAD, 2018). Summer fruit production is the highest in Nawalpur (8604 mt) followed by Tanahu (7478 mt), Baglung (1507 mt) and lowest in Myagdi (1229 mt) and no summer fruits have been cultivated in Manang and Mustang (MoALD, 2018).

Citrus

The citrus fruit cultivation is in 3423 ha (Productive area 5844ha) land and it shares around 15 percent (16735 mt) of the fruit production of Gandaki Province. As compared with the national level data, it ranks fifth position in terms of acreage and production (Figure 1,2; MoALD, 2018).

Districts	Mandarin	Sweet Orange	Lime	Lemon	Others	Total
Syanja	14,073	185	429	209	289	15,185
Tanahu	9,682	313	765	199	269	11,229
Gorkha	9,399	269	500	49	93	10,311
Parbat	3,850	3,217	610	101	121	7,898
Kaski	5,693	28	115	101	121	6,057
Baglung	2,114	47	56	64	-	2,282
Myagdi	1,583	344	166	35	45	2,173
Lamjung	1,004	264	238	-	217	1,722
Nawalpur	527	-	36	-	-	563
Total	47,926	4,667	2,914	758	1,155	57,420

Source: MoALD, 2018

Table 4 shows that citrus fruit cultivation and production was highest in Syanja (14,073 mt) followed by Tanahau, Gorkha, and Parbat. Manang and Mustang do not produce citrus at all. Among citrus mandarin alone covers 80 percent area (approx. 4627 ha.) and production is 47,926 mt. In national level Gandaki province is number one in terms of mandarin fruit production. Productive area under citrus is the highest in Syanja (1423 hectares) followed by Tanahau (1192 ha), Gorkha (982 ha), Parbat (890 ha), Kaski (564 ha), Myagdi (282 ha), Baglung (252 ha), Lamjung (199 ha) and Nawalpur (60 ha), respectively. Other promising districts for other citrus fruits are Parbat (Sweet orange) and Tanahau (Lime) (MoALD, 2018).

Winter Fruits

Deciduous fruits cultivated area in Gandaki Province is 3423 ha with productive area of 1853 ha and it shares around 15 percent (16735 mt~rank 5th) (MoALD, 2018). Approximate shares of winter fruits: apple (41%), pear (28%), peach (11%), plum (7%), hog plum (7%), walnut (3%),

apricot (1%), pomegranate (1%) etc. Mustang ranks first in terms of apple production in Gandaki Province. Mustang and Manang districts are the major areas for production of deciduous fruits.

Coffee

Gandaki province covered 34 percent (909 ha) area with 31 percent (166 mt) green beans production if compared with the national production. Green bean production order is as follows, Syanja (45 mt), Kaski (35 mt), Parbat (25), Lamjung (18 mt), Tanahau (11 mt), Myagdi (9 mt), Gorkha (8 mt). Coffee has the export potential to foreign countries.

Status of horticulture crops nursery in different districts

There are approximately 38 fruits and coffee crop nurseries and 22 floriculture nurseries in Gandaki (FAN, 2015). The floriculture nurseries are confined only in Pokhara Metropolitan City. Some of the fruits and coffee nurseries and possible estimated fruit saplings are presented in Table 5 below.

S.N	District	No of nurseries	Mandarin	Lime	Other citrus	Kiwi	Guava	Avocado	Coffee	Total
1	Gorkha	8	142950	185200	15800					343950
2	Lamjung /Manang	4	500	180000					43000	223500
3	Syanja/Kaski	15	120300	15000	4200		2500	12000		154000
4	Tanahu/Nawalpur	1	6000	500	200				1200	7900
5	Myagdi/Mustang	3	32000	-	-	-	-	-	-	32000
6	Baglung/Parbat	7	62300	25000		18750				106050
	Total	38	335250	405700	20200	18750	2500	12000	44200	867400

Source: All AKC's of the province

Most of the horticultural nurseries produce saplings of mandarin, lime, coffee. Gorkha district produces maximum saplings followed by Lamjung, Syanja, Parbat, Myagdi, and Tanahau district respectively as shown in table 5.

Vegetables

There are more than 53 types of vegetable crops cultivated in Gandaki Province. The major vegetable crops cultivated area is 47508 ha (rank 5th) which produces 558950 mt (around 8 % ~ rank 6th) annually. Share of vegetable production is approx 53 percent followed by potato 36 percent and spices 10 percent in this province as extracted from table 6.

The ginger production rank 2nd with 44992 mt production in this province. However, in comparison with the national production Gandaki's share of spices is 12.28 percent followed by vegetables 7.48 percent and potato 7.10 percent, respectively. Gandaki province is first in terms of yams, colocassia and other tuber crop production.

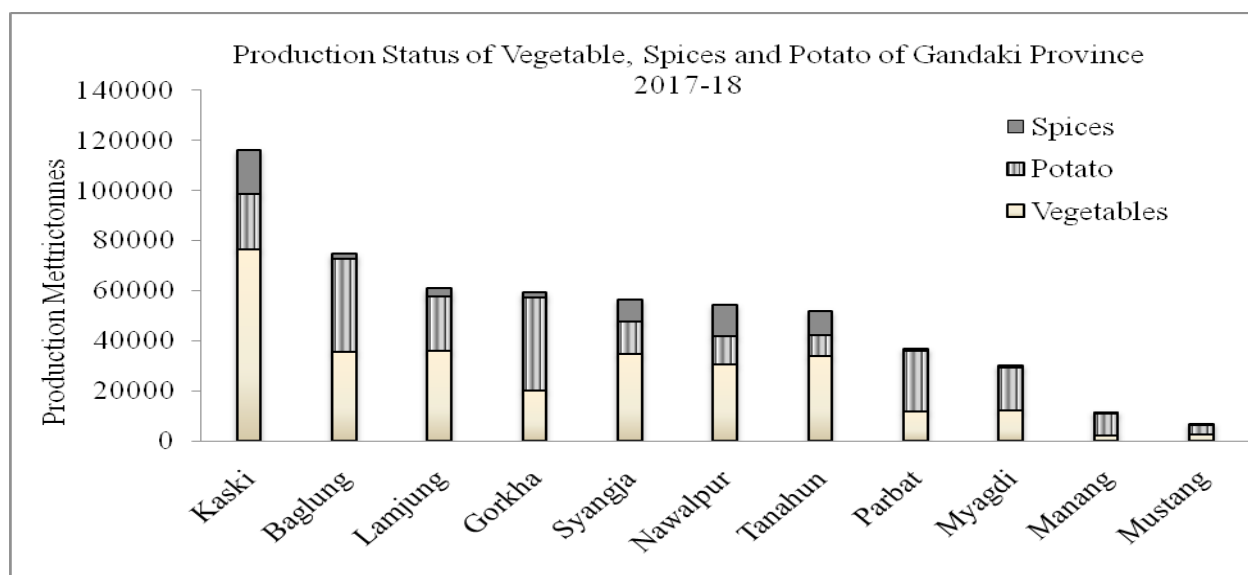


Figure 4. Production of vegetable, potato and spices in 11 districts

S.N	Districts	Vegetable	Spices	Potato
1	Kaski	5488.91	2597.52	1708.19
2	Lamjung	3484.84	692.19	1888.00
3	Baglung	2645.44	290.28	3000.00
4	Tanahun	3268.26	1031.67	802.96
5	Nawalpur	2595.51	1255.79	993.00
6	Gorkha	1878.35	371.76	2519.00
7	Syangja	2640.14	824.03	875.00
8	Myagdi	1030.63	148.42	1615.00
9	Parbat	866.41	106.14	1560.00
10	Manang	166.38	14.65	648.00
11	Mustang	195.47	21.53	285.00
Gandaki		24260.33	7353.99	15894.15
Nepal		286864.08	62068.90	195173.40

Source: MoALD, 2018

MAJOR HIGHLIGHTS OF THE PROGRAMS

Recent programs implemented by the Agriculture Development Directorate (ADD) in 2076/77 are as below.

- Establishment of 20 cold rooms for fruits and vegetables in partnership with

private sector with allocated budget worth approximately NRs 30 Million.

- Establishing one processing center and 3 tissue culture laboratories in partnership with private sector with allocated budget worth approximately NRs 16 Million.
- Supporting in existing apple orchard

improvement and management in Manang district with budget approximately NRs 1.5 Million

- Providing support in construction of seed potato storage store and large cardamom storage house in Lamjung District and budget worth approximately NRs 7 Million.
- Providing support in construction of ginger collection, processing and storing house in Tanahu and Nawalpur districts and budget worth approximately NRs 4 Million.
- Providing support in construction of community seed storage house in Nawalpur and budget worth approximately NRs 5 Million.
- Providing support in construction of three screen houses for production of improved fruit saplings in Tanahu, Lamjung and Gorkha districts and allocated budget is worth NRs 10 million.
- Besides these above mentioned major programs the other programs like construction of Krishi Bazaar shed house, model farms and other programs of Agriculture Knowledge Centers have some impacts in promoting horticulture crops production, post-harvest handling and marketing in future.

Major programs led by the Ministry of Land

Management, Agriculture and Cooperatives (MoLMAC)

Major highlights of Gandaki province Ministry program is to provide improved apple saplings (approximately around 49 thousand) to the farmers of Gorkha, Manang and Mustang district only and budget allocation for this program is about NRs 45 Million.

Prime Minister Agriculture Modernization Project (PMAMP) block and pocket programs

Prime Minister Agriculture Modernization Project (PMAMP) has been implemented since fiscal year 2016/17 as a complementary project of Agricultural Development Strategy (ADS) with the aim of modernization of agriculture through different activities. Federal Government program PMAMP pocket and block programs are implemented by this province through six Agriculture Knowledge Centers (AKCs). Major blocks and pockets running in the province are shown in table 7. Under PMAMP, approx. 120 Small Commercial Agricultural Production Centers (Pocket), approx 32 Commercial Agricultural Production Centers (Block) are running in the Gandaki province. One pocket is equivalent to 10 ha (open area) or 1 ha (plastic house) and one block is equivalent to 100 ha (open area) or 10 ha (plastic house).

Table 7. Horticulture crop based blocks and pockets of Agriculture Knowledge Centers

S.N	Name	Tanahu/Nawalpur		Gorkha		Syanja/Kaski		Mustang/Myagdi		Lamjung/Manang		Baglung/Parbat	
		Pocket	Block	Pocket	Block	Pocket	Block	Pocket	Block	Pocket	Block	Pocket	Block
1	Vegetables	2		1		8	1	1	1	2	1	13	4
2	Potato	1		1	3		1	3	1			9	1
3	Large Cardamom			1	1	12	1					14	2
4	Ginger/ Turmeric	2										2	
5	Vegetable seed							1				1	
6	Mandarin	3	4	1	1	9	1	2				15	3
7	Coffee			1		3							
8	Lime			1	1	1				1		3	
9	Banana	1	1									1	1
10	Litchi	1			1								
11	Apple								1				
12	Kiwi											3	
Total		10	5	6	7	33	4	6	4	3	1	61	11

Source: AKCs

HORTICULTURAL RESEARCH ACTIVITIES IN GANDAKI PROVINCE

Regional Agriculture Research Center, Lumle and Horticultural Research Center, Malepatan are the two leading research centers of Nepal Agricultural Research Council (NARC) conducting horticulture crops research in Gandaki Province. These research stations provide hope to solve the multiple problems in horticulture sector ranging from pest and diseases, poor productivity, providing improved germplasm for cultivation, etc.

Horticultural Research Center (HRS), Malepatan

Research on horticultural crops includes trials on lablab bean, faba bean, cowpea, garlic, garden pea, taro, plastic house cucumber, gladiolus, asparagus bean, turmeric and ginger clones etc. Cross cutting issues like research on pest management in various vegetable crops are ongoing. Many special projects like Kisanka Lagi Unnat Biubijan Karyakaram (KUBK) program produced about 10 kg breeder seed, and 185 kg foundation seed. HRS, Malepatan has been conducting research on managing macadamia nut dropping problem and varietal evaluation of William hybrid and Jhapali banana in Nawalpur (HRS, 2019).

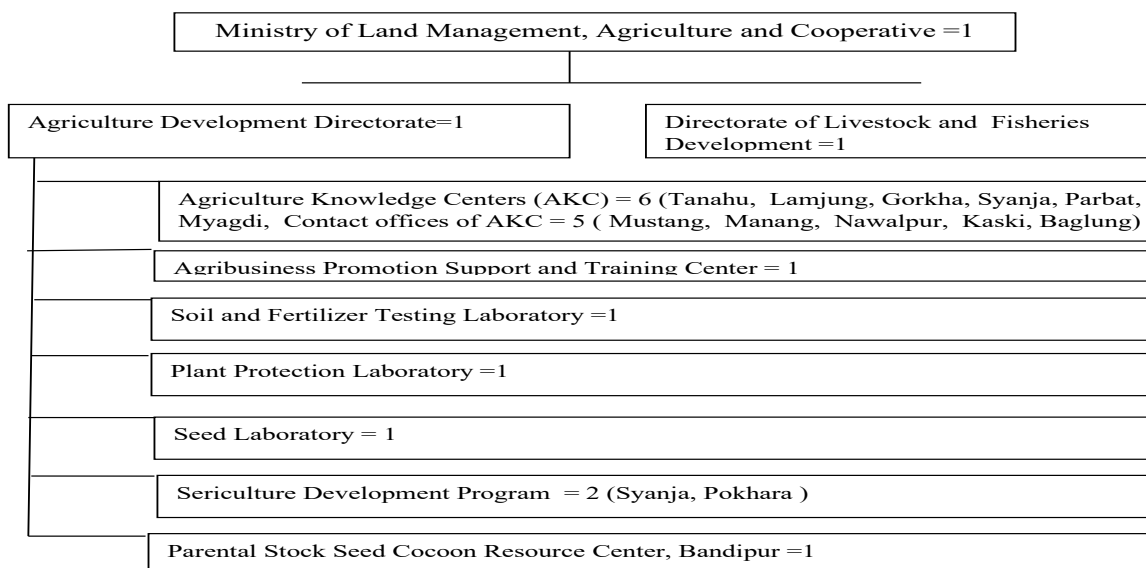
Regional Agriculture Research Station (RARS), Lumle

Regional Agriculture Research Station (RARS), Lumle has been conducting research activities in potato on different aspects like production, storage and others. Several trials were conducted on vegetables (potato, tomato, cauliflower, french bean, broad leaf mustard, chilly, capsicum, sweet potato, cabbage, cauliflower, tomato, radish, carrot, chili, brinjal, garlic, onion, broccoli, broad leaf mustard, peas, french bean and soybean). RARS, Lumle has conserved ten different species of fruits (pecan nut, persimmon, macadamia nut, peach, plum, pear, kiwi, apple, lassi and fig), 10 varieties of tea (Gulmi selection, Tagda-78, Tagda-383, Happy valley, Ambary-2, Sundram-78, Phub chhiring-1404, Phub chhiring-1258, Minipress, Balasan) and 3 varieties of large cardamom (Golsai, Ramsai, Dambarsai) and 18 species of flowers. A total of 30.01 kg breeder and 9.26 kg foundation seeds of different vegetable crops were produced in the station. Seedlings of different vegetables were produced and distributed year round. 4,165 seedlings/saplings of Orange and 854 seedlings of Lime were produced in the station (RARS, 2019).

ORGANIZATIONAL STRUCTURE AND CHALLENGES

Organizational structure

Present organizational structure of Ministry of Land Management, Agriculture and Cooperatives responsible for policy guidance and implementation of agricultural development programs is presented below:



Functions of some organizations

These organizations are involved in service delivery in overall sectors of agriculture and not only in horticulture alone. But major organizations which have relevance to horticulture crops are mentioned as below:

- Soil and fertilizer testing laboratory is the only laboratory which tests soil samples and fertilizer in Gandaki.
- Implementation of Seed quality control measures to ensure quality seeds to farmers by Seed Laboratory.
- Plant protection laboratory objective is to provide laboratory facility in diagnosis of plant diseases, survey surveillance, emergency plant protection program, pesticide and its uses awareness program, plant clinic, pest residue analysis, Integrated Pest Management (IPM) program, monitoring of farmer field schools (FFS) etc on regular basis.

Organizational challenges

1. No separate specified division in AKCs for doing specified Horticulture programs.
2. There must be Agriculture Knowledge Center in each districts.
3. There is not a single provincial horticultural farm in this provincial structure.

In spite of this organizational challenges other hurdles are always there from planning to implementation which are listed below :

- Program implementation procedures and practices (Notice announcement, cost estimation, local bodies' recommendation, insurance, commitment letter etc) are lengthy.
- Less staffs in the current provincial structure because of several reasons (retirement, no new recruitment, etc) that affects in service delivery in spite of the sufficient budget allocation for program.

WAY FORWARD

Gandaki adopted various strategies with certain priorities and those were reflected in different plans. Regular dialogues need to be held among stakeholders for agricultural or horticultural policy and planning. New programs should be planned targeting resource poor farmers or the rural youths on production basis and for this creation of latest database in coordination with all the municipalities is needed. More chances of duplication of programs from Federal and Provincial Ministries, Directorates, Agriculture Knowledge Centers, PMAMPs (Zones, Super Zones), local bodies etc should be minimized. Therefore, while planning the stakeholders must sit together in planning process to get expected outcomes already set by province planning commission. Furthermore, rational planning is needed to match with the socio economic status and requirement of some resource poor farmers to attract them in the application for the grant program. Program load should match the work load of the limited staff in Gandaki and the capacity building is needed for the technical staffs.

Revolution for accelerating the productivity growth in horticulture sector is also required to address some problems of production. The slow growth in the production of major fruits, vegetables, are attributed to inadequate supply of quality seeds, quality saplings, limited irrigation facility, inefficient marketing and supply chain. Horticulture has big and many roles to play in adapting to climate change, including increasing resilience of livelihoods, improving nutrition and providing vital ecosystem services. Horticulture has direct relation with tourism. Thus, agro tourism is directly related with improved roads, number of tourists (national and international), thus minimum quality standards of horticulture products need to be set for safety and hygiene of tourists. Mustang and Manang can be developed as the apple hub and remaining districts as Mandarin, ginger and coffee hubs.

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