



## Abolitionist for agrarian of hilly regions by soil superintendence and fertility management on horticultural cultivation in Kumaun Himalaya, Uttarakhand

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### Abstract

*Soil, water and air are very important components for sustaining of plants and all living things also which are living on our planet. Soil is acting an important role plays the most basic essential needs such are holding capacity of plant, transfer to nutrition properties, development and growth of plants also. This nutrition's utilize to all living things for their developing, if the soil will not be fertile will be reflected on a low amount of production, low productivity and low nutritional value of crops. Besides results will be shown as waste of more time and money, diversion and untoward of the farmer and the beginning of the indigence cycle of landholders, etc., Therefore, soil is very important properties for horticultural development also in agricultural activities in Kumaun Himalayas. This study will be relevant and useful for entire of Himalaya regions, because of there are 82% population depend on the primary activities mainly and only one of the agricultural cultivation approximately.*

**Keywords:** Horticultural Convex, Lesser Himalaya, Income Generation, Soil Fertility.

### I. Introduction

Kumaun region lies between 28°44' to 30°49' north latitudes and 78°45' to 81°2' east longitudes along the eastern and southeastern parts of Kumaun Himalaya in the state of Uttarakhand. All Kumaun Himalaya regions come under all types of different physiographic zones and terrain. Kumaun Himalaya is extended Tarai-Bhabar to higher Himalaya, which are elevations from mean sea level below 250m to above 5500m.

As a result of variation of the different natural estate, geographical, climatic and rich biodiversity, various agro climatic zones like that sub-tropical, sub-temperate and temperate zones. Due to there are most favourable condition for all types of horticultural crops as Apple, Plum, Guava, Papaya, Almond, Mango, Litchi etc. Uttarakhand produces about 1.79 m MT of horticulture produce from an area of 0.27 m. Ha. The major horticulture produce comprises fruits (40.14%) and vegetables (57.57%) 0.36 lakh MT of fruits have been traded in organized markets with average price of Rs 17.31/kg, 1.86 lakhs MT of vegetables have been traded in organized markets with average price of Rs 5.49/kg. (Indian Horticulture Database Data period: 2010–11). Uttarakhand state is secured ranking in all India in different horticultural crops, which are Apple-3<sup>rd</sup>, Peas 7<sup>th</sup>, Cut-flower 7<sup>th</sup>, and Litchi is 7<sup>th</sup> rank.

### II. Soil Composition in Kumaun Himalaya

Soil formation is an immature stage in Kumaun Himalaya, therefore color, structure and physical characteristics is similarly close to rocks or stone, which are formed by the same. Mainly have two types of soils in Kumaun Himalaya first is with limestone and other without calcium carbonate soil, rocks accordingly geological formation and major soil classification are alfisols, insectisols and aldisols. Any soil type and compositions show below table;

**Calcic Soils:** These types of soils are made by lime stone, dolomite lime stone etc. with have varies soil structure mostly composed to calcium and magnesium and soil activeness are neutral and

alkaline and pH value have between 7.5 to 8.5 which are suitable for calcium friendly horticultural crops are citrus type fruits, Guava and radish, cabbage vegetables etc. somewhere different regions have small patches in all Kumaun Himalaya regions are located mainly are **BageswarKapkot, Ramanagar, Syaldey , Bheemtal, Jyolikot, Betalghat, Kanalichina, Queeti, Didihat, Lohaghat, and Berinag, etc.**

**Non Calcic Acidic Soils:** These are soils formation by garniferous, folite muscovite and granite rocks and pH value between are 3.8 to 6.5 and are acidic properties. Mineral contents compositions are rich for potash and calcium and magnesium are moderate to general condition. These soils are in high altitudinal zones and very suitable conditions are for temperate and sub-temperate fruit crops, which have generally in Kumaun Himalaya regions. calcic acidic soil have in main four groups as Brown forest soil, Podzol soil, Red loam, Began wooden with humus soils.

**Brown, Forrest soils:** color has dark brown and soil composition granular with in ample humus which is soil reaction PH value 4.5 to 6.0. Quantity of Calcium, magnesium and Nitrogen decreasing in the deepest layer dwindle A layer to D layer, But sometimes we necessary to be use of calcium carbonate and fertilizers accompanist as the treatment, then brown forest soils can very appropriate for temperate horticultural crops.

**Podzol Soil:** Podzolic type soils have iron ash and humus mix in different layers and leach to makes a thickness layer. Somewhere hard pan soil form makes in corresponding thickness layers and pH value is 3.6 to 5.7. Soil compositions have granular and prismatic form with light brown color and organic carbon may be 1.0% to 6.0%. In upper to lower layer increasing amount of different contents such as; calcium, clay, iron and hydroxide etc. these types of soils are eligible for temperate type of horticultural crops even if the ample use of manure, fertilizers and calcium carbonate and should be plough hard layer of soil until 01 metre deeper, then Podzol Soil will be able to useful for healthy cultivations.

**Red Alluvial soil:** Lateritic soil and red loam soils have instated in peaks of mountain or hill and steep sloppy regions mainly. All soil nutrients flow out by bleaching and sheeting with run of water due to heavy rainfall and weathering in Sloppy and hilly regions as well as entire Kumaun Himalaya. Upper surface layer soil formation are a granular and gravel and low humus, these soil colour are red or yellowish although Organic carbon in very low amount, therefore such as soils for shabby treatment is a necessity of organic fertilizers; manure, zinc, compost etc. pH value of this soils are 4.0 to 5.6 and successive increasing amount of acidic and silica element although decreasing element amount of iron ash in upper to lower layer of soils composition. Lateritic soil and red loam soils always necessity treated from organic fertilizers and other needed pesticides then useful to cultivation of horticultural practices.

**Granular wooden Soil:** Granular soils have water logging area and continue out flow of water regions often, which are a dust-coloured and granular texture without layering. Organic carbon has 03% to 08% and pH value may be 5.0 to 6.9. These types of soils are Successive increasing amount of aluminium, iron ash and silica element although decreasing element amount of magnesium and calcium in upper to lower layer of soils composition, therefore these regions are not favourable for any more cultivation of horticultural crops, but if from proper swamp of drainage system management to may be able to cultivation of water logging regions and will be necessary to sufficient use to calcium carbonate and fertilizers.

**Non-Calcium carbonated acidic Soils:** Acidic soil is in general in entire Kumaun Himalaya regions and it is very high amount of acid and moderate amount of mica element, therefore as soils are not appropriate for horticultural crops and cannot useful for human being, because of vastly feeding beyond as required absorbing by plants such as elements; aluminium, manganese and iron etc. The resulting of access of other elements in plants to harmful for human being whose will use to horticultural outputs. Whereas organic material not decomposed in soils whereby do not be such a low synthesis process of nitrogen and phosphorus. As soils regions are prone area of soil erosion and

may be landslides. Non-Calcium carbonated acidic Soils can be utilized and favourable for Horticultural cultivations, but some remedies should be follow up as use to calcium oxide as form of  $\text{Ca}(\text{OH})_2$  accordingly know to pH value of soils regions and then apply on different pH value. It can be use to entire in Kumaun Himalaya and after treated make useful. See as bellow table 1;

**Best remedies & prevention of soil by Fertilizers:** Soil management as a remedies for healthy soil and healthy soil becomes to including in soil are micro nutrition, mineral, humus etc. fertilizer fulfil to lack of nutritional contents and maintain to fertility of soil, therefore fertilizers are main role playing after green revolution in Indian agricultural cultivation as well as in horticultural cultivations. For Kumaun Himalaya is must be necessity to use of fertilizers for increasing production and remedies of soil, because here soil is not more fertile for varies cultivations, wherewith here horticultural practices are in poor condition, although climatic conditions are favourable for all various of horticultural cultivation.

**Table 1: Treatment of soil for acidic soils can be applied of Calcium carbonate according to different pH value of soil of Kumaun Himalaya**

pH Value	Sandy Soil	Sandiness with Domat	Alluvial Soil	Matiyar soils
6.0	25.0	60.0	80.0	100.0
5.5	84.4	151.0	145.0	160.0
5.0	140.0	170.0	190.0	230.0
4.5	195.0	230.0	245.0	285.0
4.0	250.0	290.0	300.0	340.0

Source: Directorate of Horticulture and Food Processing, Uttarakhand

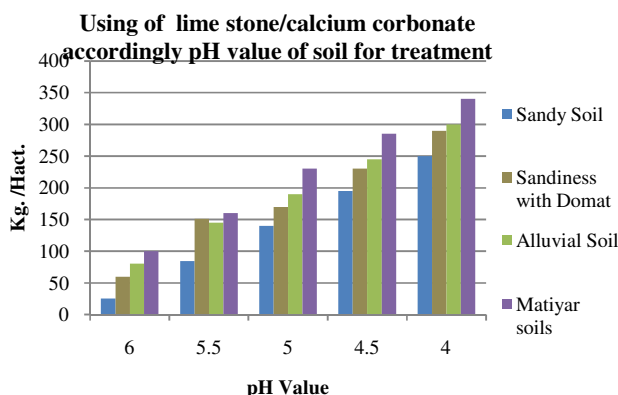


Fig.1

After soil testing farmer can use and apply fertilizers for different soil and various horticultural plants accordingly. Fertilizers can be use organic and pesticides such as are Urea, Ammonia sulphate, single super phosphate, dye ammonium phosphate, 2,4-D beutaclore, anelophos etc. Different plants necessity of fertilizers ratio is in various amount, therefore according to fruits plants needs fertilizers status should be presence in soil then farmer can be get produce more production from plants that is indispensable for horticultural cultivation. Some table suggest for agrarian for direction of fertilizers use which is shown below;

**Table 2: Use of guidelines of Fertilizers and General status of Fertilizers in soils**

Sl. No.	Fruit Crops	Manure/Compost (kg)	Nitrogen		Phosphate Super Phosphate (Gram)	Potash Murat Potash (Gram)	Quantity of year & Per Year can increase quantity according to Tree Age
			Calcium Ammonia (Gram)	Urea (Gram)			
1	Apple, Peach, Cherry	6	121	60	130	39	Up to 22 years
2	Apple, Semi Bona variety	6	90	50	65	25	Up to 12 years
3	Apple, Bona variety	6	90	50	65	12	Up to 08 years
4	Peach	6	155	75	190	50	Up to 11 years
5	Aonla	6	210	95	155	35	Up to 12 years
6	Apricot, Almond	6	122	60	150	40	Up to 11 years
7	Walnut	7	120	60	300	40	Up to 31 years

8	Grapes	3	110	50	60	70	Up to 08 years
9	Citrus variety	5	250	100	280	40	Up to 17 years
10	Mango	10	250	150	200	90	Up to 16 years
11	Litchi	6	600	280	160	120	Up to 11 years
12	Decidua	7	70	50	50	40	Up to 12 years
13	Banana	6	950	430	250	190	Up to 01 <sup>1/2</sup> year
14	Jackfruit	6	350	160	190	65	Up to 11 years
15	Papaya	4	110	55	250	30	Up to 02 <sup>1/2</sup> years

Source:Primary

### III. Conclusion

The Uttarakhand state comes under 86% hilly regions and 14% area Bhabar and Tarai regions, which is under a gentle slope or plains. Although roughly three-fifths of the working population of Uttarakhand is engaged in traditional agriculture, less than one-fifth of the total area of Kumaun is drier cultivable. Steep slopes require careful terracing and irrigation, with water drained from the upper levels used to irrigate the lower ones. This method of terrace cultivation allows fields to be sown more than once per year. Wheat is the most widely cultivated crop, followed by rice and various types of millets, which are planted on the drier leeward slopes. Other important crops include pulses (legumes) such as peas and chickpeas, oilseeds such as soybeans, peanuts, and mustard seeds, and assorted fruits and vegetables. As a result of high input of money and man power and output production and productivity is very low, whereas farmer cannot generate income regularly and they migrate to other occupations. They have no any base of still on the cultivation there. Soil of Kumaun Himalayas is very poor but climatically is very favourable for all types of horticultural crops, whereas apple fruits growing since 18<sup>th</sup> century on somewhere small patches in Kumaun Himalaya. Besides of apple another fruits is not developed due to various causes. Horticultural crops cultivation culture have extended in large scale on the land areas but production is not enough for farmers, market and neither not generated regularly on yearlong. This study can give the right path of farmers horticultural cultivation is a cultivation of thrift, low input of labour, one time investment, high output, continuous income generation, security of live and control of population exodus from cultivation. If treated the soil and determine the nutrients and mineral in the soil of Kumaun, can be increase of production and productivity of horticultural crops. This study recommends the cultivation of horticultural crops accordingly soil type and related soil patches of the corresponding block wise. This paper which shows that all regions units are favourable for particular crop accordingly soil and according to pH value can use chemical fertilizers, whereas can be sustained the fertility. This study will be valuable mostly for entire Himalayas regions for especially on horticultural cultivation. Its use can result in substantial economic return for farmers in Kumaun Himalayas.

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