Journal of Pharmacognosy and Phytochemistry
Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2018; SP1: 2265-2267

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Assessment on soil fertility status of farmers of godawari municipality, Lalitpur district

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Abstract
Soil fertility is one of the major factors responsible for sustaining the agricultural productivity. The study was conducted on the assessment of soil fertility status of farmers of Godawari municipality, Lalitpur District, Nepal from 12thAugust to 23rdoctober. The sample size was 30, selected by simple random sampling method. Total 30 soil samples were collected randomly from a depth of 0-20 cm using soil sampling auger. The study revealed that the average pH of soil was 6.68, available phosphorus level was 49ppm and available potash level was 431ppm. Similarly, OM and nitrogen content was 3.72% and 0.19% respectively. Based on laboratory analaysis done at Soil Management Directorate (SMD) laboratory, Hariharbhawan the soil fertility status of Godawari municipality was moderate. The observed data revealed that majority of the land i.e. 53.33% of the crop growing area had medium nitrogen content, about 60% had medium to high phosphorus content, about 80% medium to high potash content, 56% had medium soil organic matter and about 53% had neutral soil pH. Majority of the soil i.e. 87% belonged to sandy loam textural class which is favorable to maize, potato, etc. cultivation. Local farmers need to be made aware about the effective ways to improve their soil health. Balanced and appropriate dose of fertilizers should be recommended based on availability of soil nutrients, to maintain the soil fertility.

Keywords: Soil fertility status, soil nutrient, sampling.

Introduction
Soil fertility is the ability of soil to supply essential nutrients in a balanced way for the proper growth of the plants. Soil fertility evaluation is the basic decision making tool for balanced and efficient nutrient management. It helps to quantify the nutrient status of the soil for crop productivity. Soil testing is the most widely used tool for determining soil fertility level and for making balanced and efficient fertilizer recommendations.
Lalitpur district covers an area of 385 km² and has a population of 525,211 (CBS, 2016). It is one of the three districts in the Kathmandu Valley, along with Kathmandu and Bhaktapur. It is surrounded by Makwanpur, Bhaktapur, Kathmandu & Kavre. The total arable land of Lalitpur district is 7020.8 ha under which land under permanent crop is 381.9 ha (CBS, 2011/12). Lalitpur district covers 16,904 ha for cereal crops and 1,911 ha for vegetables (MoAD2015/16). About 70% of the commercial farmers of this district are using more amount of chemical fertilizers rather than organic manure. This practice can lead gradually deteriorating soil properties. In the context of Nepal, soil nutrient depletion is a serious constraint to food production. (Rijal, 2001). Inappropriate and continuous application of chemical fertilizers could lower the crop productivity. Therefore it is important to assess the soil fertility status which helps to maintain the nutrients availability in the soil.

Materials and methods
The study was initiated from 12th August to 23rd October at the farmer fields of Godawari municipality of Lalitpur district, Nepal. It is situated in the South of the district. It covers an area of 96.11 km^2 and lies in between 27.6016° N and 85.3653° E.

Fig 1: Map of the study site

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Soil sample collection
The sample size was 30 which was selected by simple random sampling method. Total 30 soil samples were collected randomly from a depth of 0-20 cm using soil sampling auger.The composite soil samples were collected for routine analysis.

Laboratory analysis
The collected soil sample were taken in the soil laboratory to evaluate soil fertility status (NPK, OM, pH and texture). The different tested parameters and their methods are shown on the table 1.

Table 1: Different soil parameters tested and their methods adopted at lab of Soil Management Directorate, Hariharbhawan.

S.N.	Parameters	Methods
1	Total nitrogen (%)	Kjeldahl method
2	Available phosphorus (ppm)	Modified olsen's bicarbonate method
3	Available potash (ppm)	Flamephotometer
4	Organic matter (%)	Walkely and Black
5	Soil pH	pH meter
6	Soil texture	Hydrometer method

Statistical analysis
Descriptive analysis (mean, standard error, standard deviation, maximum and minimum) of soil parameters were determined by using MS excel. The interpretation were done by standard analytical values/ratings given by Soil Management Directorate (SMD 2010), shown on the table 2.

Table 2: SMD rating of soil reaction, organic matter content, totalnitrogen content, available phosphorus and available potash in soil

Nutrients	Very High	High	Medium	Low	Very Low
Total OM %	**>10**	**>5**	**>2.5**	**>1**	**<1**
Total N%	**>.4**	**>.2**	**>.1**	**>.05**	**<.05**
Available P2O5(Kg/ha)	**>110**	**>55**	**>30**	**>10**	**<10**
Available K2O(Kg/ha)	**>500**	**>280**	**>110**	**>55**	**<55**
Soil pH	**Alk**	**NN**	**SA**	**A**	**HA**
<4.0	**<4.1**	**<4.2**	**<4.3**	**<4.4**	**<4.5**

Result and discussion
The laboratory analysis results are presented and discussed in the headings below.

Table 3: Soil fertility status of soil samples, Godawari, Nepal.

Descriptive statistics	pH	OM %	N%	$P_2 0_5$ ppm	$K_2 0$ ppm
Mean	6.68	3.72	0.19	49	431
Standard error	0.12	0.25	0.01	8.17	64.16
Standard deviation	0.65	1.34	0.06	44.74	351.41
Minimum	4.9	1.005	0.05	4.58	112.73
Maximum	7.7	6.432	0.32	230.83	1664.52

Soil Reaction (pH)
The pH of the soil varied from 4.9 to 77 with the mean value of 6.88 (table 3). This indicates neutral pH. The study shows that the 53% sample had neutral soil, 33% had slightly acidic, 7% hadalkaline soil and 7% sample hadacidic soil (Fig 2).

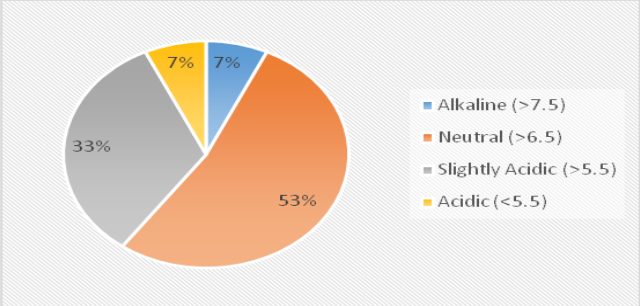

Fig 2: Soil reaction (pH)

Soil organic matter
The soil organic matter ranged from 1.005 to 6.432% with the mean value of 3.72% (table 3). This indicates medium status of soil organic matter. The study shows that 66% of sample had medium level of organic matter content, 17% had high OM content and 17% had low OM content. (Fig. no.3).

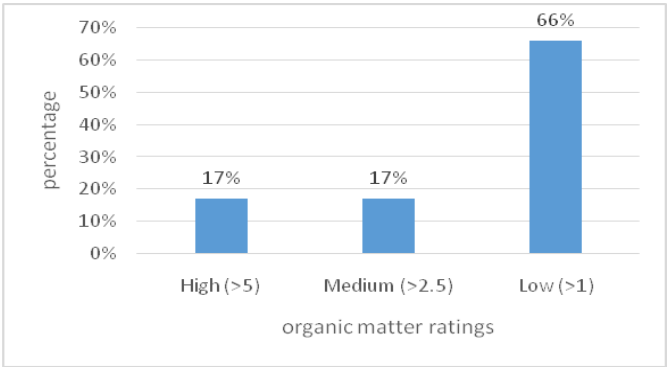

Fig 3: Organic matter content

Total nitrogen
Table 3 shows that the total nitrogen ranged from 0.05% to 0.32% with an average of 0.19%. The total nitrogen percentage in the soil of the study areas found to be medium. From this study, it was found that about 7% of sample had low, 40% had high and 53% had medium nitrogen content (fig 4).

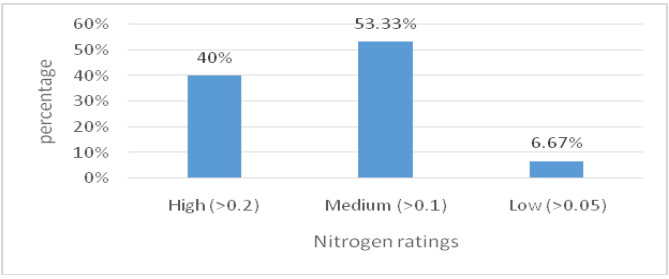

Fig 4: Total soil nitrogen percentage

Total phosphorus
Table 3 shows that the available phosphorus ranged from 4.58 to 230.25 ppm with the mean value of 49 ppm. This shows high status of available phosphorus. The study shows that about 10% of the sample were very low, 30% were low, 27% were medium and 33% were high in phosphorus content (fig 5).

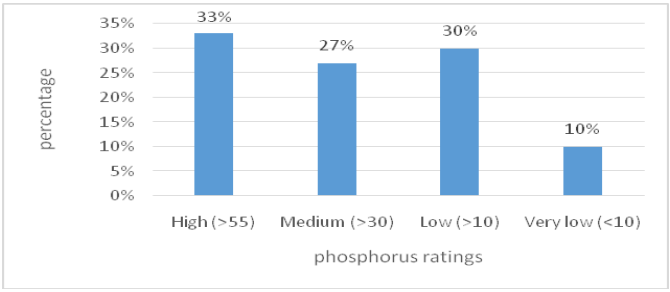

Fig 5: Available phosphorus percentage

Total potash

The available potash was ranged from 112.73 to 1664.52 ppm with an average value of 431ppm. This shows high level of potash in soil. The study data shows that about 43% of sample had found medium soil potash, about 37% of soil had high content and about 20% had very high potassium content (fig 6).

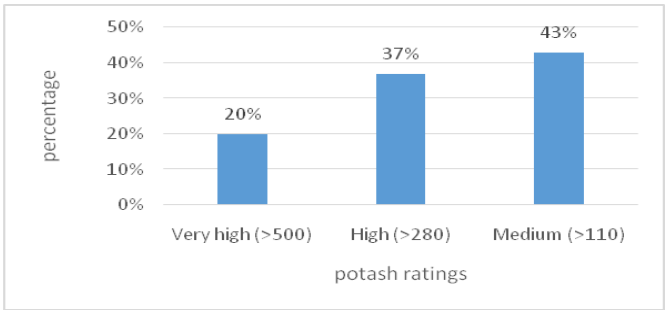

Fig 6: Available potassium content

Soil texture

The table 4 shows that sand % ranged from 59.54 to 79.4 % with an average of 66.748% and clay% ranged from 4.75 to 20.75% with an average of 10.116% and silt% ranged from 11.85 to 28.15% with an average of 22.986%. The study shows that 87% of soils were found sandy loam followed by 10% sandy clay loam and only 3% loamy sand textural classes.

Table 4: Particle size distribution of soil

Descriptive statistics	Sand %	Clay %	Silt %
Mean	66.748	10.17	22.99
Standard error	0.95	0.8	0.89
Standard deviation	4.74	3.99	4.46
Minimum	59.25	4.75	11.85
Maximum	79.4	20.75	28.15
Variance	22.48	15.85	19.92

Summary and conclusion

Soil fertility has adverse impact on production. Decrease in fertility cause decrease in productivity.The study revealed that the average pH of soil was 6.68, available phosphorus level was 49ppm and available potash level was 431ppm. Similarly, OM and nitrogen content was 3.72% and 0.19% respectively. Majority of the land i.e. 53.33% of the vegetable growing area had medium nitrogen content, about 60% had medium to high phosphorus content, about 80% medium to high potash content, 56% had medium soil organic matter and about 53% had neutral soil pH.Majority of the soil i.e. 87% belonged to sandy loam textural class. Theaverage soil fertility status of the samples were found to be moderate. Balanced and appropriate dose of fertilizers maintain the soil fertility.

Suggestions

1) Soil fertility evaluation should be done within 3-4 years intervals to know the soil status which helps to maintain soil health and productivity.
2) Farmers should be encouraged to use organic manures rather than chemical fertilizer to improve physicochemical and biological properties of soil.
3) Balanced and appropriate dose of fertilizers should be recommended to farmers based on the nutrient availability of soil.

References

1. Central Bureau of Statistics. National Population and Housing Census (National Report). Kathmandu, CBS, 2011-2012.
2. Central Bureau of Statistics. Compendium of Environment Statistics Nepal. Kathmandu, CBS, 2015-2016, ISBN: 978-9937-0-0443-5
3. Ministry of Agricultural Development. *Nepal Portfolio Performance Review*. Nepal, MoAD, 2015.
4. Rijal S. Soil Fertility Decline in Nepal: Problem and Strategy. Nepal Journal of Science and Technology. 2001; 3:41-46. file:///C:/Users/Bikash/Downloads/63-83-1-PB%20(1).pdf