

## **Socio-Economic Status and Influence on Soil Nutrient Management Practice in Siddharthanagar Municipality, Nepal**

**Damodar Gautam<sup>1\*</sup>, A Shrestha<sup>1</sup> and D Dhakal<sup>2</sup>**

<sup>1</sup>Technical Officer (T-6), Nepal Agricultural Research Council (NARC), Nepal

<sup>2</sup>Seed Production Officer, Unnati Seed Company Ltd., Nepal

**\*Corresponding Author:** Damodar Gautam, Department of Soil Science, Institute of Agriculture and Animal Science, TU, Nepal.

**Received:** August 08, 2018; **Published:** October 25, 2018

### **Abstract**

Socio-economic factors like economic status, education level, gender of household head, number of members in family, ethnicity, etc. plays important role in crop production and soil fertility management practice. Soil fertility is degrading year by year due to the sole use of chemical fertilizers, limiting the crop production. To investigate the socio-economic status and influence on soil fertility management practices a survey entitled "Socio-economic status and influence on Soil Nutrient Management Practice and their Constraints in Siddharthanagar Municipality" was conducted. Field survey, key informant interview, was carried out by developing well-structured and pretested questionnaire. 95 households were selected from 13 different wards of the municipality through simple random sampling. The study revealed the factors considered by farmers in managing soil and socio-economic constraints behind the reasons for soil fertility decline. The study also displayed 68% of farmers apply inorganic fertilizers only, while there were no farmers practicing organic cultivation. The study also showed that 96.2% of the total respondents who were illiterate did not know about the role of NPK in crop production, while the 80% respondent having their education level bachelors and above knew the role of NPK in crop production. There was significant gender effect of household head and use of FYM. The study also revealed that only 17% of the respondents have tested their soil prior to crop cultivation. Future research strategy should be made to improve socio-economic status and the potentiality of crop production by the sustainable soil nutrient management.

**Keywords:** Socio-Economic Factors; Soil Nutrient Management; Crop Production

### **Introduction**

Agriculture is main source of livelihood for the majority people in Nepal. About 65.6 percent of total population is engaged in agriculture sector which accounts for 28.7 percent of total GDP [1]. To overcome the food crisis, the improvement of soil fertility plays very important role (DOA, 1999). Hartemink, *et al.* (2008) recognized several constraints in soil fertility management in Nepal because of deforestation and other land use enhanced erosion by water and wind, salinization, flooding, water logging, and fertility depletion (Jacinthe, *et al.* 2004). Another major cause of fertility loss is landslide and soil erosion, which is common in hilly areas of Nepal. Various studies have estimated the soil loss ranging from 0.2 - 10.5%. Rowell (1994) felt that soil is often primary resource for households in agrarian communities and the management of its fertility is essential to the enduring prosperity of such households. Continuous cultivation without addition of substantial amount of SOM in terai region and sharp decrease in SOC and nitrogen (Shrestha *et al.*, 2006).

Small households soil fertility management practices are interconnected with their production system, economic status, tenancy status, education level, adoption of new technology, social external environment and finally to the government policies. Mainly educated farmers concerns with soil nutrient management with sustainable crop production, on the other hand illiterate farmers primarily concerns with

instant higher level of production with irrational use of fertilizers and chemical pesticides. In the context of Nepalese farmers family size and level of incomes becomes another important parameters on deciding farming practices. households getting income from off farm activities do not practices raring of livestock, mulching, use of organic fertilizer and in advanced condition farming too. Social condition of farmers like participation on social work, member of co-operative and groups, ethnicity, interaction with the community members and co-operation between farmers and household are the vital social factors which directly affects the farming system and thereby soil nutrient management. The sufficient amounts of water, compost, and labor, a suitable climate, and with appropriate management, any soil can be made fertile and productive [2] but using only chemical fertilizers resulted in poor nutrient handling of soil, nutrient leaching, loss in water holding capacity, poor aggregate stability and various problems (Brady, 2001). Anonymous [3] sensed that the hesitation of farmers over soil testing and its usefulness in fertility management, they often apply chemical fertilizer higher than the plant demands which ultimately results in fertility degradation in long run. In terai, soil fertility is maintained largely by application of compost and manure [4]. Bari land usually receives several times as much compost as does Khetland. A second method of maintain soil fertility is through in-situ manuring. Other methods of maintain soil fertility are trapping of flood water, cutting and composting natural green species into rice paddies and using grain legumes in rotation.

The Ninth plan highlights the importance of soil management to the country in the following way: "A system of soil testing at farmer's level for the proper application of chemical fertilizer has not been in vogue in Nepal. Enough attention has not been given to the mixed use of organic manure and chemical fertilizer. Therefore, there is considerable loss in soil fertility. Similarly, proper attention to cope with the depletion of soil fertility has not been paid. With the implementation of the APP and considering the increased use of fertilizer, there is a need to have soil management program to maintain soil quality and fertility [5-23].

### Objective

The objectives of the study was to:

- Identify effect of socio-economic factors and its influence on soil management practice.
- Classify farmer's constraints, behind the decline of soil fertility.
- To know about the inter-relationship between socio-economic factors, crop production and soil nutrient management.

### Methodology

Siddharthanagar municipality was selected for the purpose of data collection. It consists of 13 wards. From each ward, 7 - 8 respondents were selected randomly. And with the help of well-structured and pretested questionnaire field survey was conducted. The total numbers of household were 95.

Data was collected from the field survey for about 20 days during April-June, 2017. During the field survey, data collection was done interviewing with the farmers of the selected sites. Focal group discussion and co-operative mediated discussion was also done to get the efficient and accurate data. Secondary data were collected thorough various sources like internet, journals, research papers, proceedings, newspapers, data available in related organization and offices etc.

### Result and Discussion

#### Education status of respondents

Among 95 households 27 were illiterate, 25 literates, 24 have attained secondary level, 14 have attained intermediate and 5 have attained bachelors and above. Thus the study shows that most of the respondent under the study area are illiterate.

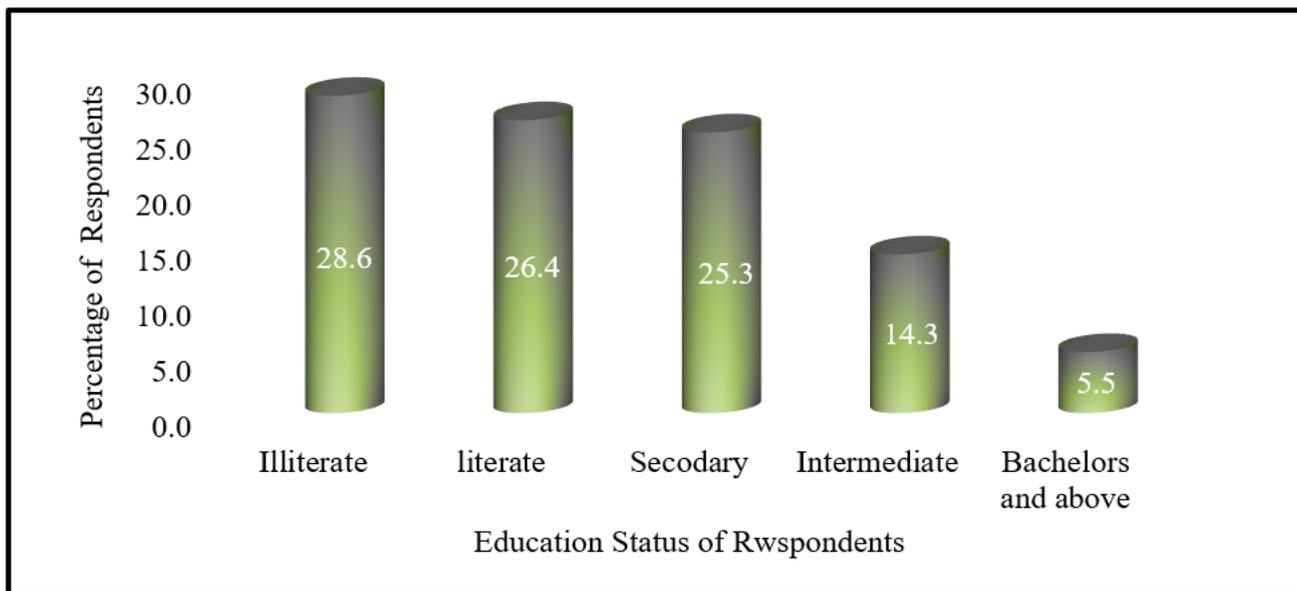


Figure 1: Education status of the respondents in Siddharthanagar Municipality, 2017.

**Family size**

The study revealed that the mean family size was 6.7, ranging from the largest family size 15 to smallest size 3. The standard deviation of the family size was found 2.34. The detail of family size is described in the table 1 below.

Family Size
Average Size (Mean): 6.7
Minimum: 3
Maximum: 15
S.D.: 2.34

Table 1: Family size in the study area, 2017.

**Tenancy status**

The study revealed that 72% have their own land and 13% have leased land where as 15% of the respondents had both type of land.

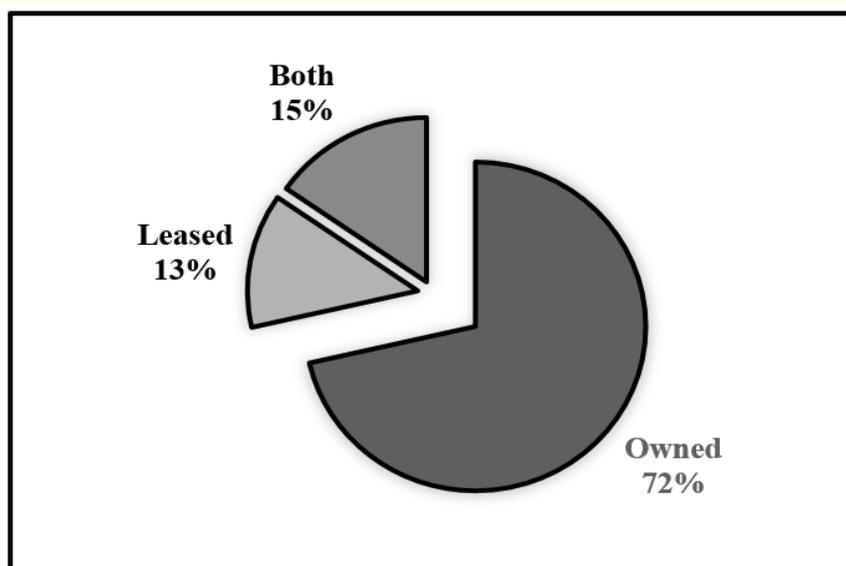


Figure 2: Tenancy status of the respondents in Siddharthanagar Municipality, 2017.

### Type of fertilizer use

This study reports that out of total respondents 62% apply chemical fertilizers while 38% apply both type of chemical fertilizers. There was no record of application of organic fertilizer.

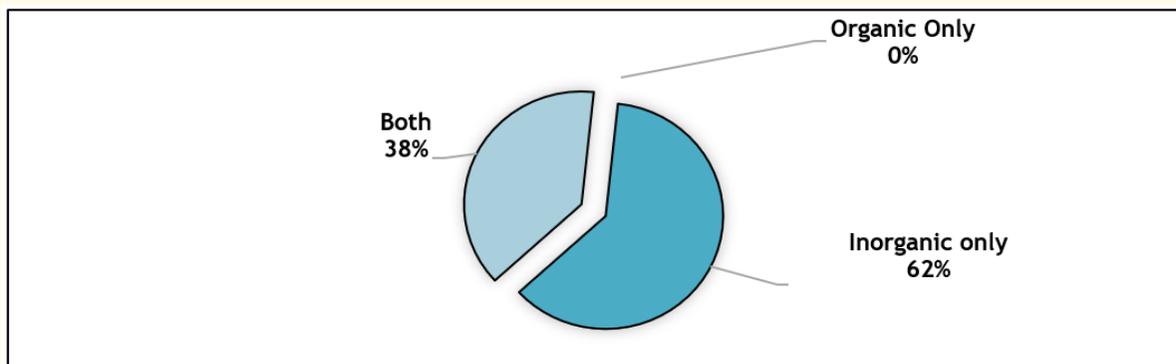


Figure 3: Fertilizer type of respondents in Siddharthanagar Municipality, 2017.

### Use of FYM and compost

The study shows that 65.9% of respondents uses FYM while only 9.9% only applies compost.

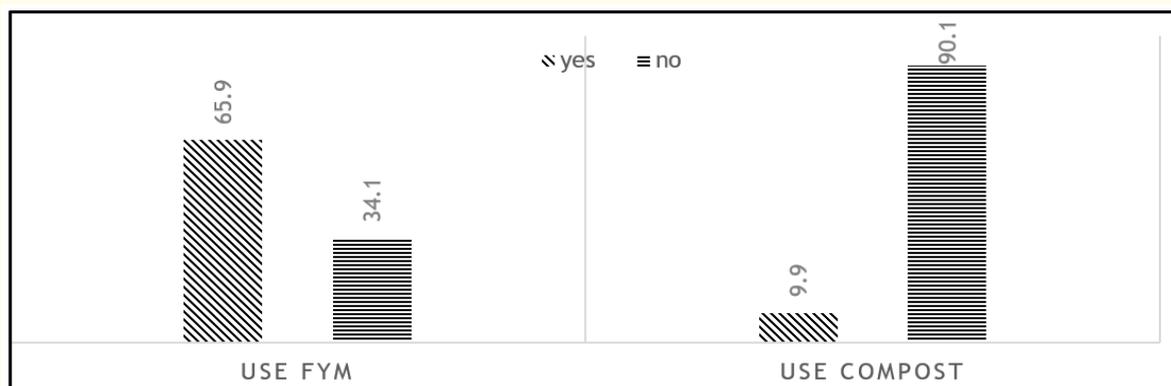
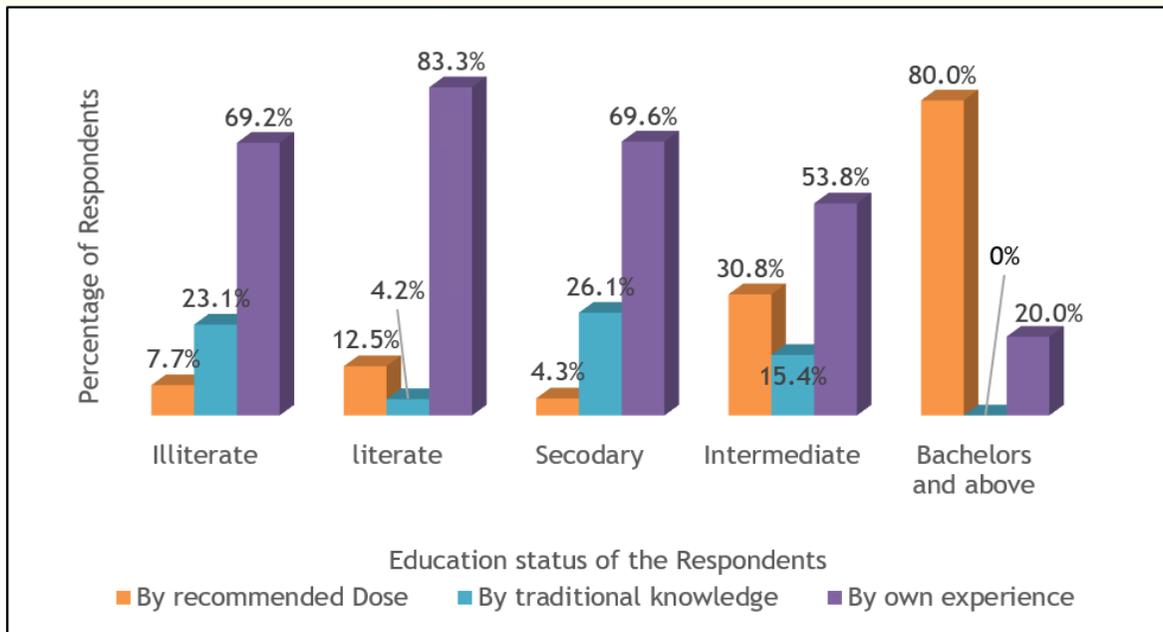


Figure 4: Use of FYM and compost by the respondents in Siddharthanagar Municipality, 2017.

### Effect of education level on method of calculation of synthetic fertilizer

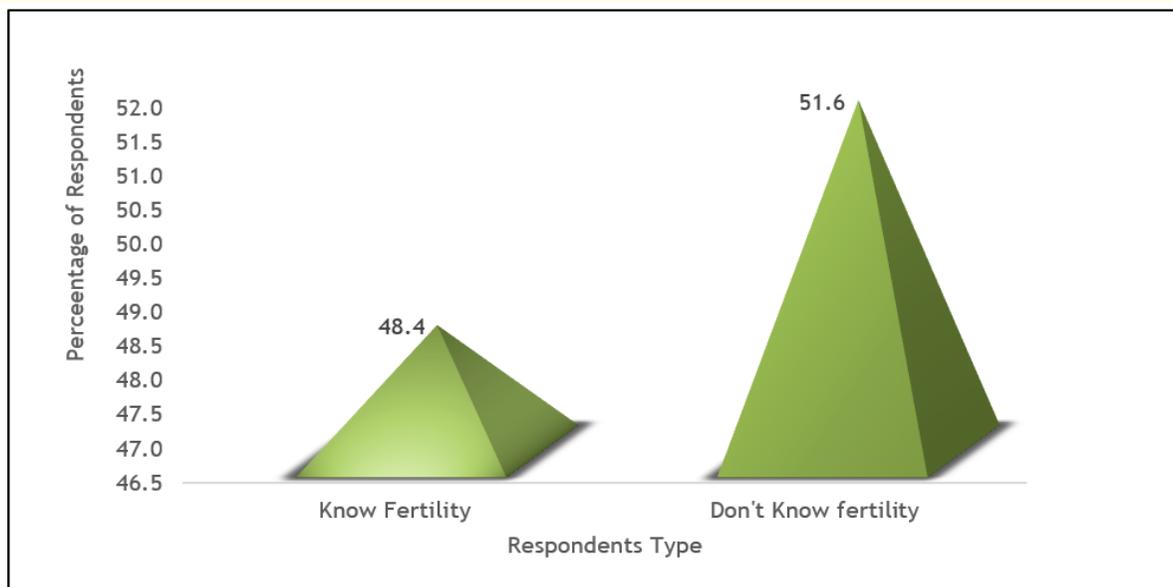
The study revealed that higher the education level the farmers apply the fertilizers according to recommended dose while illiterate farmers calculate the application dose by their own experience. This is significantly different and the value is  $p = 0.001$  which is less than 0.05.



**Figure 5:** Education level on method of calculation of synthetic fertilizer of respondents in Siddharthanagar Municipality, 2017.

**Knowledge about the soil fertility**

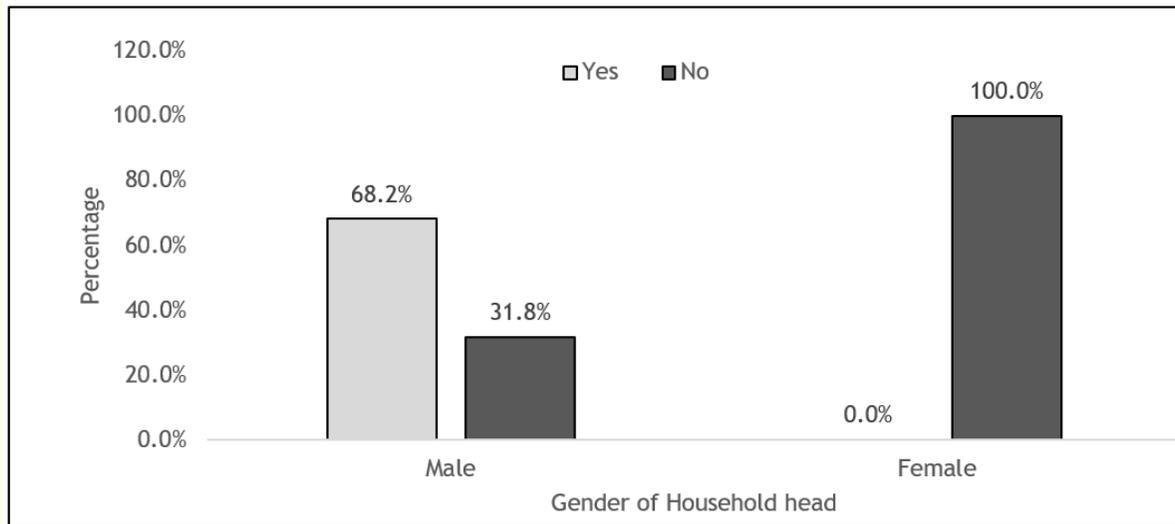
The study revealed that 51.6% of the population did not know about soil fertility whereas 48.4% of the population had the knowledge about the soil fertility.



**Figure 6:** Knowledge about the soil fertility.

**Effect of gender of household head on FYM use**

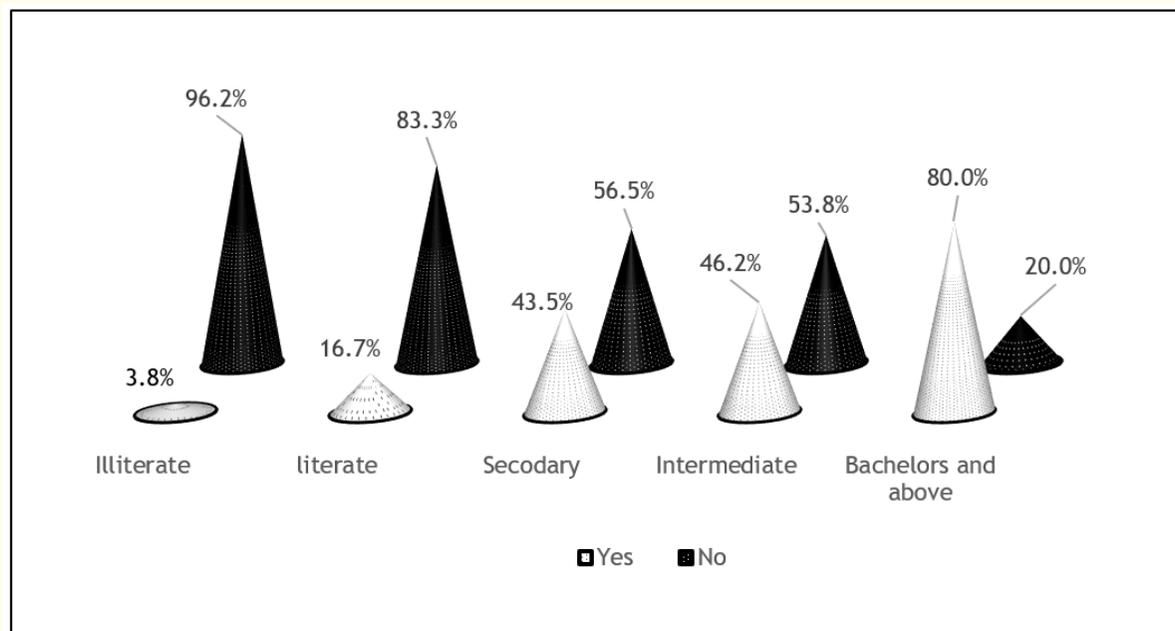
The study exposed that 68.2% of the male uses FYM while there were no female household applying FYM. This may be attributed to male dominated society and labor intensive work.



**Figure 7:** Household head and FYM use of the respondents in Siddharthanagar Municipality, 2017.

**Effect of education status on knowledge of role of NPK**

The study discovered that education level is significantly ( $p = 0.000$ ) effecting the knowledge of role of NPK in crop production. With increasing education level knowledge of role of NPK is also increasing. 96.2% of the total respondents who were illiterate did not know about the role of NPK in crop production, while the 80% respondent having their education level bachelors and above knew the role of NPK in crop production



**Figure 8:** Education status and knowledge of role of NPK of the respondents in Siddharthanagar Municipality, 2017.

### Farmers perceptions towards soil characteristics

During the study farmers set their own characteristics in classifying soil fertility. The following parameters were considered by farmers.

Soil Characteristics	
More Fertile	Less Fertile
Black, Sandy, Loose, Soft, Mixed Manure	Red, Yellow, Clay
Below forest area	Lack of irrigation
Close to river bank	Coarse
Access of irrigation	Difficult to plow
Easy to plow and dig	Less Production
More Production	Rainfed
	Sloppy
	Less use of FYM

**Table 2:** Perception towards soil characteristics of respondents in Siddharthanagar Municipality, 2017.

### Constraints behind the reasons for soil fertility decline

Reasons	Ranking
Use of chemical fertilizers	1
Less animals	2
Less use of FYM	3
Lack of adequate green leaves and forest area	4
Top soil washed down	5
Disappearance of in-situ manuring practice	6
Mono-cropping	7

**Table 3:** Ranking the constraints for the soil fertility decline of respondents in Siddharthanagar Municipality, 2017.

### Factors considered by famers in managing the soil

Water Management	Fertility Management	Labor Management
Precipitation	Precipitation	Location of Land
Soil Texture and Depth	Soil Texture	Livestock
Cropping Intensity	Access to Inputs	Ownership/Tenure
Water Source	Access to Markets	Mechanization
	Land Ownership/Tenure	
	Labor	
	Information related to fertility	

**Table 4:** Factors considered by respondents in managing the soil in Siddharthanagar Municipality, 2017.

## Conclusion

The input of applying chemical fertilizers to various crops is of considerable significance to the farmer. The majority of farmers, including the respondents of KII and HH surveys, repeatedly mentioned that the soil is deteriorating because of the application of chemical fertilizers. Consequently, crop productivity is reduced. The farmers imply that the hardness of the soil and the difficulty in ploughing were due to soil deterioration caused by the application of chemical fertilizers. In the study area, 64% of the total respondent apply solely chemical fertilizers.

Level of education of farmers, ethnicity, gender of household head, and other socio-economic factors were interrelated with soil nutrient management practice. The study revealed that 68.2% of the household head of male uses FYM while there were no female household head applying FYM. This may be attributed to male dominated society and labor intensive work. The study discovered that education level is significantly effecting the knowledge of role of NPK in crop production. With increasing education level knowledge of role of NPK and its effect on soil fertility is also increasing. 96.2% of the total respondents who were illiterate did not know about the role of NPK in crop production and soil fertility management, while the 80% respondent having their education level bachelors and above knew the role of NPK in crop production.

The application of the FYM was limited in the study area because of shortage of livestock species, lack of fodder and labor. 65.9% uses FYM and majority of the farmers incorporate FYM during the final stage of land preparation. The farmers in the study area had identified some locally available plants which are used for green manuring. These plants and leaves were cut into pieces and used mainly for rice. The use of Dhaincha was hardly mentioned by the farmers. Leguminous crops are grown in most of the surveyed areas but mainly on Bari land. There is plenty of scope and potential to promote Oleguminous crops in the surveyed areas. Unfortunately, most of the sampled farmers were ignorant of the benefits of growing leguminous crops as a green manure.

Deterioration of soil fertility is one of the most limiting factors of crop production. This study investigates the soil nutrient management practice of both land types of terai region. In developing country like, Nepal where the population is increasing in geometric rate and the crop production is limited, soil nutrient management plays important role. The study concludes that there was a strong effect of socioeconomic factors on the soil management practice. Will we ever realize how critical it is to conserve our soils?

## Bibliography

1. CBS. Environment Statistics of Nepal, Central Bureau of Statistics, Nepal (2015).
2. Tamang D. "How Hill Farmers Manage their Soils in the Book entitled Indigenous Management of Natural Resources in Nepal Published by Winrock International". Kathmandu, Nepal (1996).
3. Anonymous. British Soil Science Society, Volume 5 No. 32, London, UK (2009).
4. Riley KW. "Soil Fertility Maintenance for Sustainable Crop Production in the Mid Hills of Nepal". In the Workshop Proceedings of Soil Fertility and Erosion Issues in the Middle Mountains of Nepal held in Kathmandu. Sponsored by IDRC, Canada (1991).
5. Anonymous. Nepal Agriculture Research Council Journal, Volume 4 No. 34, Kathmandu, Nepal (2005).
6. NPC. "The Ninth Five Year Plan (1997-2002), Unofficial Translation in English". Nepal (1998).
7. Archer L., *et al.* Sustainable Agriculture Research and Education Program. "Soil Nutrient Management". What is Sustainable Agriculture? UC Division of Agriculture and Natural Resources (2017).

8. Ghani A and MW Brown. "Improvement of Soil Fertility in Nepal through Balanced Application of Fertilizer" (1997).
9. Gregory PJ. "Soil Fertility Management for Sustainable Hillside Farming Systems in Nepal". Project Draft Report, ODA and Soil Science Department, The University of Reading, UK (1995).
10. Joshi KD., *et al.* "Indigenous Methods of Maintaining Soil Fertility and Constraints to increasing productivity in Mountain Farming systems". In Proceedings of Workshop on Formulating a Strategy for Soil Fertility Research in the Hills of Nepal. A Joint Publication of LARC, Nepal and NRI, UK (1995).
11. Kiff E. "A Review of Literature Relating to Soil Fertility in the Hills of Nepal". A Joints LARC - NRI, Publication, LARC, Kaski District, Nepal (1995).
12. Maske RB and D Joshy. "Soil and Nutrition Loses under Different Soil Management Practices in the Middle Mountains of Central Nepal". Workshop Proceedings of Soil Fertility and Erosion Issues in the Middle Mountains of Nepal held in Kathmandu, Sponsored by IDRC, Canada (1991).
13. Mathema SB. Activities and Achievements of SIN, Spotlight, Volume 16, No. 29, Kathmandu, Nepal (1996).
14. Mathema SB., *et al.* "Socio-economic Research on Management of Soil Fertility in Hills of Nepal". The Paper presented in the Workshop on Enhancing Farmer's Livelihood in the Hills of Nepal through Improved Soil Fertility organized jointly by National Agriculture Research Council and The University of Reading (1999).
15. Poudel K. Food Security: A New Challenges, Spotlight, Volume 17, No. 16, Kathmandu, Nepal (1997).
16. Rasali DP. "Contribution of Livestock to Soil Fertility Management Systems in the Western Mountains of Nepal". In Proceedings of Workshop on Formulating a Strategy for Soil Fertility Research in the Hills of Nepal. A Joint Publication of LARC, Nepal and NRI (1995).
17. Sberchan DP and GB Gurung. "Production and Management Techniques of Compost to Sustain the Hill Agricultural Production System". PAC Technical Paper 171. PAC, Dhankuta, Nepal (1996).
18. Sthapit BR. "The Results of a Soil Fertility Thrust SAMUHIK BHRAMAN: Traditional Methods of Sustaining Crop Productivity in the Lower Hills (300 - 700m) the Problems and Potentials". Technical Paper 1988/19. LARC, Kaski District, Nepal (1998).
19. Tripathi BP. "Long Term Effect of Farm Yard Manure and Mineral Fertilizer on Rice and Wheat Yields and Nutrient Balance in Rice-Wheat System at Khumaltar Condition". LARC Seminar Paper No. 96/35. LARC, Kaski district (1996).
20. Tripathi BP. "Present Soil Fertility Research Status and Future Research Strategy in the Western Hills of Nepal". LARC Seminar Paper No. 97/2. LAC. Kaski District, Nepal (1997).
21. Tripathi BP. "An Overview on Long-term Effects of Organic and Inorganic Fertilizers on Crop Field and Soil Properties in the Eastern Hills". Lumle Seminar Paper No. 98/21. LARC, Kaski District, Nepal (1998).

22. Turton C. "An Analysis of Soil Fertility Issues in the Hills of Nepal". A joint Project between LAC and NRI, LARC, Kaski District, Nepal (1995).
23. Vaidya AK and D Gibbon. "Survival and Sustainability in the Mid-Western. Hills of Nepal". Seminar Paper No. 93/1. LAC. Kaski District, Nepal (1991).

**Volume 13 Issue 11 November 2018**

**©All rights reserved by Damodar Gautam., *et al.***