



Assessment of Soil Suitability for Fruits Cultivation in Dhule District (M.S.)

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Abstract:

Agriculture is not only an occupation but also a way of life. However, farmers cultivating traditional crops are incapable to harvest adequate food and grains for the livelihoods. It forces framers to opt for alternative farming. Therefore, a shift has been seen from traditional crop system to more productive and remunerative fruit cultivation. Horticulture is a best way for agro economic empowerment. The study area mainly consists of basalt rock however difference in the micro-climatic condition formed varied types of soil. So that determines cultivation various fruit crop in study region. The soil of study region can be broadly grouped in to four subtype's viz deep soil, moderate medium, shallow, very shallow. But difference in the micro-climatic conditions along with the topography at different location mainly altered the physical characteristic of the basic soil type. The shallow and medium soils occupy 65.6% cultivable area. This area indicates the abundant availability of for growing pomegranate cultivation in Dhule district. Those are respectively suitable for banana, papaya, grapes, guava, and pomegranate cultivation.

Keywords: Horticulture, Cultivation, Spatio-temporal, Rural economy, Arid and semi-arid

Introduction

Soil is the chief natural factor on which the success or failure of growth of fruit depends. For the production of any crop the type of soil is very important. Dhule district under is located in peninsula region of India. This is covered with 'Great Deccan Trap' of volcanic formation. This study region difference in the micro climatic condition along with the topography at different locations mainly altered the physical characteristics of the basic soil types. But the fruit cultivation is not particular about the soil type. It can be grown in various soil types such as medium and deep soil with widely ranging characteristics. It thrives on comparatively shallow or even murmy soils, where other fruits fail to flourish (Patil and etc all 2002). But pomegranate, crustered apple and K leman trees are perennial fruit crop, it stands in a field for 10-14 years. Therefore, for growth fruit trees proper soil condition is necessary to get best economic remuneration. As a result, employment, per capita income, foreign exchange, social and economic growth has been observed. Overall nature of Indian farming is changing. Since last two decades, horticulture production has been increased considerably (Singh H. P. 2009).

Study Area:

The shape of the study area is triangular. It is located in the northern part of the Maharashtra State. It has occupied over an area of 8063.11 sq. km. It is extended from 20038 N to 21039 N latitudes and from 73050 E to 750131 E longitudes (Fig. No.1). Dhule district is separated from Madhya Pradesh State, while 'Satmala' ranges separate the district from western Maharashtra.

LOCATION MAP



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- To study different soil types of study region
- To understand the suitability of soil types for fruit crops in study region.

Hypothesis:

The physical factor of soil types determines cultivation of various fruit crops in study region.

Methodology:

The present paper is based on secondary data and field observations. Data on area of horticultural in Dhule district collected from department of district agricultural office. Data related to area of different horticultural crop is collected from agricultural office data base for the year 1901-02 to 2016-17. Table and diagrams were prepared to show growth of pomegranate cultivation in Dhule district. In study region soil classification was understood for suitability of fruits cultivation.

Discussion:

The soil of study region can be broadly grouped into four subtypes. Those are discussed in detail as below. The depth, texture and colour were three major physical characteristics of soil that determines the yield of fruits quality and quantity. According to the depth of soils as stated by pomegranate growers at the time of interview, the sample pomegranate plantation were classified into four micro types in the given below table.

The field survey data indicates the feasibility of coarse textured soil type for pomegranate

cultivation. Since, 35.7 and 29.9 percent were pomegranate plantation in shallow and medium soil types respectively. The significant proportion of pomegranate plantation 11.3 percent is also planted very shallow (murky) soil type. Though deep soil is good and fertile but only 23.2 percent pomegranate were planted in this soil type. The comparative economic benefits of above soil types of pomegranate cultivators were attempted and cost benefit ratio is calculated separately. Table indicates that average productivity of all sampled pomegranate was 9.1 tons per hectare.

Table : Soil Type of Sample Pomegranate Growers and Production in Dhule District

Sr. No.	Soil Types	Soil Depths in cm	Category of Farmers			Total	% of growers	Production (tons/ ha.)
			Small	Medium	Large			
1	Deep Soil	>50	39	27	10	76	23.2	8.02
2	Modreat Medium	25 to 50	48	27	23	98	29.9	9.82
3	Shallow	7.5 to 25	59	39	19	117	35.7	8.94
4	Verry Shallow	0 to 7.5	18	5	14	37	11.3	8.13
Total / Average			164	98	66	328	100.0	9.1

Source: District Agriculture Department, 2018

1. Deep Soil (Depth above 50 cm):

Deep soils are popularly known as 'Black cotton soil'. As this soil from basalt rock, the colour of parent material containing iron (Ferrous) hence they are reddish brown, dark brown to grayish brown colour. Its depth is 50 to 100 cm. Another group different from the above soil in the thickness of soil profile, it is deeper 100 cm to 150 cm and colour which is much darker. In fact, these are alluvial soil occupy the flood plains. Due to a sudden decrease in the slope of the Tapi river basin some part of Tapi river is quite deep and fertile soil. Deep and very deep soils are good fertile in nature but it was not suitable for pomegranate fruit crop cultivation. In the study region 23% growers have deep soil which gives only 7.9 tons per hectare production, hence CBR is lowest.

Deep soils are compact, impervious, more proportion of clay and moisture nature. Pomegranate tree cannot tolerate water beyond more than 50 percent of soil's moisture capacity. Extra amount of moisture causes decay and fungicide of roots. So it leads to dying of plants known as wilting of pomegranate cultivation. It's not only effects on production by reducing the number of pomegranate trees per hectare but also increases the extra expenses of farmers to control this disease.

The compact nature of soils leads to develop wide cracks in soils during sunny season. Such soil cracks may cause physical disturbance to the shallow roots of pomegranate tree that develops in shallow root system. Fertile deep soils are good for more vegetative and productive magnification in pomegranate cultivation. It is also characteristic of deep soil with various pomegranate crop. Therefore, the production of pomegranate is not copacetic from deep soil.

Deep soils have good natural fertility that minimized cost of fertilizers. Its soil type had incurred lowest gross cost (Rs.194551.94) in all soil types under pomegranate cultivation. In spite of that lower yields obtained from these soils brought down the net profit (Rs.207766.99 /ha.) of respondents. By and large, deep soil even though fertile in nature but shown poor response for pomegranate production, as it demonstrated low returns and stood at third place in CBR (1:2.07).

2. Moderate Medium Soil (Depth 25 to 50 cm)

Medium soil is very proper for the fruit crop. In the study region 29.9 % pomegranate growers belongs medium soil. The texture of these soils differs from sandy to loamy sands so that contains medium amounts of silt but high amount of clay and sandy soils. In other words more number of coarse particles than fines. This type of soil texture not only facilitates vital properties of soil such as soil accretion, water percolation and root penetration of pomegranate tree. Near about 30% growers have moderate medium soil, which give 9.82 tons per hectare production. It is good for pomegranate cultivation. On the other side, due to favorability of medium soils utmost yields 9.62 tons/ ha. is produced along with superior quality of fruits received premier market rates. Net profit is Rs.345109.82/ha. gained by respondents. Overall, pomegranate orchards developed in medium soils demonstrated uppermost CBR (1:2.71) among all soil types of study region. This provides evidence of favorability of medium soils for good pomegranate production in study area.

3. Shallow soil (Depth 7.5 to 25cm)

In the study region the percentage of shallow soil is higher i.e. 35.7%. For the cultivation of pomegranate shallow soil is proper. On Rameshwar island only the fruit crop of pomegranate and coconut is possible and not any other (V.G. Raul-2006). The thickness of shallow soils is less than 25cm. These soil characters are light and friable. They are coarse textured contains more sand particles so water drained easily. This free water draining characteristic of shallow soil is favorable of pomegranate cultivation. Because pomegranate trees do not tolerate stagnant soil water for long time that leads to decaying and fungus of root and tree.

The limited moisture storage in soil particles are favorable condition of proper white root development system also favorable for the growth of flowers and fruits of pomegranate tree. So for as pomegranate cultivation is concerned, shallow soil is good for it shallow soil is observed near about 35.7% of the pomegranate growers which gives highest 8.94 tons per hectare production, hence CBR is highest. It amply reveals that good quality of fruits was produced in the shallow soils. Such produce fetched remunerative prices in market and net profits Rs. 237579.43 / ha was realized by respondents in this soil group. As a result, second highest CBR 1: 2.15 were revealed for shallow soils.

4. Very Shallow Soil (Depth 0.70 to 7.5cm)

In the study region the area of very shallow soil is the least one i.e. 14.7% (on the basis of survey). Pomegranate cultivation can be done in this soil too. They are very coarse textured known as murumy soils. The thickness of soil is less than only 7.5 cm. geographically; the soil horizons were not fully developed. Pomegranate growers have very shallow soil 11.3 % which gives 8.13 tons per hectare production. It contains coarse material such as number of rock fragments and more sand particles. These soils are irrigated and fertilized more frequently but satisfactory yields were not obtained. Very shallow soil is very low fertile in nature therefore, pomegranate yields were lowest tons compared to other soil types.

The pomegranate cultivation from very shallow soil revealed highest gross net per hectare. In this regard, it is worth mentioning that formerly this type of soil is either in the form of barren lands. At some growers cultivated under food grain crops such as jowar, bajara and pulses. But since last few years had been brought under drought hardy pomegranate cultivation. Therefore, this soil required more expenses for the improvement and preparation of pomegranate cultivation land such as leveling, digging and filling of pits etc. Hence very shallow soil type recorded high establishment cost. These

unproductive soils were fertilized and irrigated more frequently. Shallow soil is also prone to harmful bacterial blight (oily spot) disease on pomegranate that increases cost of pesticides so that the operational cost is also very high. Eventually tree develops on very shallow root systems due to which overall growth of trees, flowers and fruits is hampered. Inferior productivity status of these soils lowered down gross yields i. e. 8.13 tons /ha. Ultimately, this soil type also brought down net returns (Rs.153624.73) of growers and demonstrated lowest CBR (1: 1.73) among all soil types brought under pomegranate cultivation in study region.

Conclusion and Finding:

Yield and CBR analysis presented in table 5.8 points out that for study region as a whole the average CBR of pomegranate cultivation is 1: 2.16. Nonetheless, it considerably varied with soil types that are 1: 1.73, 1: 2.15, 1: 2.71 and 1: 2.07 of very shallow, shallow, medium and deep soils respectively. It proves that well drained medium and shallow are most profitable form pomegranate cultivation because the pomegranate tree develops on shallow root system. In contrast moisture retentive deep and very deep soil is less profitable. Besides, high porous medium and shallow soils were found too expensive to pomegranate production in existing water resources in the study region. The shallow and medium soils occupy 65.6% cultivable area. This area indicates the abundant availability of for growing pomegranate cultivation in Dhule district. This soil type mostly found in particular Sakri, Shindhkhede and Dhule tahsils. It provided with better irrigation facility, new migration technology then it can be best utilized for barren and dry land horticulture development. In addition to pomegranate and other drought tolerant fruit like ber custard apple, those possess ability to bear the moisture stress for several days can also be adopted for fruit cultivation.

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