



Research Paper

## Assessment of Major Soil Indices and their Relation with some Physico-chemical Soil Properties of Northern Tahsils (Jintur, Selu and Pathri) of Parbhani District

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Received 22 January, 2015; Accepted 31 January, 2015 © The author(s) 2014. Published with open access at [www.questjournals.org](http://www.questjournals.org)

**ABSTRACT:-** Study was conducted to know the status of N, P, K and S in relation to chemical properties in soils of Jintur, Selu and Pathri tahsils of Parbhani district. Total 225 surface soil samples (75 from each tahsils) were collected and analysed to evaluate fertility status of soil. The results revealed that the study area soils were neutral to alkaline in soil reaction, safe in electrical conductivity, low to high in organic carbon content and non-calcareous to calcareous in nature. Considering soil nutrient index values these soils are low in available N while medium in available P, high in available K and deficient in available S. Further, available N showed significant correlation with organic carbon and calcium carbonate, while available P and S showed significant correlation with electrical conductivity and organic carbon. A significant positive correlation was found between available K and electrical conductivity.

**KEYWORDS:-** Physico-chemical properties, NPKS, Nutrient Index

### I. INTRODUCTION

The seventeen essential elements are required for growth and development of crop out of these the nitrogen, phosphorus and potassium are the major nutrients in crop production. Nitrogen is essential constituent of chlorophyll, protoplasm, protein and nucleic acid and imparts dark green colour required for photosynthesis, while Phosphorus play important role in energy store and increasing root development and growth. It is also structural component of cell constituents of acid enzymes, proteins and lipid. There by potassium acts as catalyst in activating the plant enzymes and increasing disease resistance capacity of the plant. Soil fertility is one of the important factor controlling yields of the crop. Soil characterization in relation to evaluation of fertility status of the soil of an area or region is an important aspects in context of sustainable agricultural production because of imbalanced and inadequate fertilizer use coupled with low efficiency of other inputs, the response (production) efficiency of chemical fertilizer nutrients has declined tremendously under intensive agriculture in recent years (Yadav and Meena, 2009). Therefore, a comprehensive study was undertaken to assessment of major soil indices and their relation with some physico-chemical soil properties of Northern Tahsils (Jintur, Selu and Pathri) of Parbhani District.

### II. MATERIAL AND METHODS

The study area (Parbhani district) is located between 18° 45' to 20° 10' N latitude and 76° 13' to 77° 26' E longitude having 409 meter height over the mean sea level. Parbhani district is the northern part of Marathwada region of Maharashtra state. The geographical area of the district is 6541 sq.km. Annual rainfall is 794 mm. The district is covered by basaltic lava flow. Some layers of lava flow are hard and compact, while others are soft, principally basic volcanic rocks of basaltic and dolomite composition are involved as soil parent material. Parbhani district comprises of nine tahsils out of these the northern tahsils i.e. Jintur, Selu and Pathri tahsils were considered for the study. Nearly about 225 surface soil samples were collected from the northern tahsils of Parbhani district (Jintur, Selu and Pathri) and 15 villages were selected from each tahsil and five representative surface soil samples from each villages were collected during the year 2011-2012. The soil pH, EC, Organic Carbon, CaCO<sub>3</sub> and available K were estimated by the standard procedures as described by Jackson (1973). The available N was analysed by using alkaline potassium permanganate (Subbiah and Asija,

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1956). Available S was determined by using 0.15%  $\text{CaCl}_2$  solution (Williams and Steinberg, 1969). The soil nutrient index was calculated according to the procedure given by Ramamoorthy and Bajaj (1969)

### III. RESULT AND DISCUSSION

The results of study presented in Table (1a,b,c) indicated that all the soil samples from Jintur, Selu and Pathri tahsil were neutral to alkaline in soil reaction within safe limit of electrical conductivity. The pH of soil varied from 6.66 to 7.91 with a mean value of 7.41 in Jintur soils, 6.75 to 8.60 with an average value of 7.63 in Selu soils and 6.70 to 8.18 with a mean value of 7.65 in Pathri soil. This may be because of formation these soils from basaltic parent material rich in basic cations as reported by Mali and Raut (2001). EC of soil varied from 0.05 to 1.35  $\text{dsm}^{-1}$  with average value of 0.29  $\text{dsm}^{-1}$ , from 0.12 to 1.02  $\text{dsm}^{-1}$  with a mean value of 0.27  $\text{dsm}^{-1}$  and 0.09 to 1.56  $\text{dsm}^{-1}$  with a mean value of 0.29  $\text{dsm}^{-1}$  respectively in Jintur, Selu and Pathri tahsils. The organic carbon content was varied from 2.2 to 10.5  $\text{g kg}^{-1}$  with an average value of 6.0  $\text{g kg}^{-1}$  in Jintur, 0.7 to 13.9  $\text{g kg}^{-1}$  with an average value of 4.6  $\text{g kg}^{-1}$  in Selu and 2.7 to 9.7  $\text{g kg}^{-1}$  with an average value of 6.6  $\text{g kg}^{-1}$  in Pathri, Indicating that these soils were low to high in organic carbon content. The high content of organic carbon might be due to addition of organic matter through either artificially or naturally and its subsequent decomposition. Similar results were reported by Waikar *et al.* (2004). The free  $\text{CaCO}_3$  content was varied from 5.0 to 160  $\text{g kg}^{-1}$  with a mean value of 65.6  $\text{g kg}^{-1}$  in Jintur, 5.0 to 170  $\text{g kg}^{-1}$  with an average value of 53.3  $\text{g kg}^{-1}$  in Selu and 10.0 to 145.0  $\text{g kg}^{-1}$  with a mean value of 75.0  $\text{g kg}^{-1}$  in Pathri. These soils indicating non-calcareous to highly calcareous nature of soil. The available N was found low to moderate in soils of Jintur (106.62 to 279.10 with an average value of 186.08  $\text{kg ha}^{-1}$ ), Selu (100.35 to 398.27 with a mean value of 193.94  $\text{kg ha}^{-1}$ ) and Pathri (114.25 to 323.0 with an average value of 200.37  $\text{kg ha}^{-1}$ ). It may be due the rapid loss of applied N by the means of leaching and denitrification resulted in low amount of N in soil Tur *et al.* (2008). The available P content 9.26 to 23.97  $\text{kg ha}^{-1}$  with an average value of 14.67  $\text{kg ha}^{-1}$  in soils of Jintur tahsil, 7.20 to 23.37  $\text{kg ha}^{-1}$  with a mean value of 12.78  $\text{kg ha}^{-1}$  in soils of Selu tahsil and 7.31 to 24.61  $\text{kg ha}^{-1}$  with an average value of 14.79  $\text{kg ha}^{-1}$  in soils of Pathri tahsil were found in low to medium range. The low phosphorus content may be due to alkaline reaction and calcareous nature of soil which confirmed with the finding of Vineetha and Malewar (2009). In case of available K content, it was 190.05 to 1205.12  $\text{kg ha}^{-1}$  with an average value of 581.68  $\text{kg ha}^{-1}$  in the soils of Jintur, 305.76 to 1291.36  $\text{kg ha}^{-1}$  with an average value of 807.21  $\text{kg ha}^{-1}$  in soils of Selu and 318.08 to 1285.76  $\text{kg ha}^{-1}$  with an average value of 746.31  $\text{kg ha}^{-1}$  in the soils of Pathri was found in high. This may be due to occurrence of potash rich minerals like mica and feldspar in parent material of the soils, Tur *et al.* (2008). The available S content in the soils varied from 3.06 to 23.46  $\text{mg kg}^{-1}$  with an average value of 10.64  $\text{mg kg}^{-1}$ , 8.10 to 18.02  $\text{mg kg}^{-1}$  with an average value of 11.10  $\text{mg kg}^{-1}$  and 5.40 to 21.97  $\text{mg kg}^{-1}$  with an average value of 11.69  $\text{mg kg}^{-1}$ , respectively Jintur, Selu and Pathri tahsil. S deficiency in soil was observed in 72, 77 and 76 per cent respectively. The available S appears to be depending on the combined action of factors like nature of parent material, rain fall, clay and organic matter content in soil (Mohamed *et al.*, 2012).

**Soil Nutrient Index Value:** As per the NIV developed by the Ramamoorthy and Bajaj (1969) the nutrient index value for (Table 2) soils of Jintur, Selu and Pathri tahsils of Parbhani district represents low fertility status for nitrogen (1.06, 1.06 and 1.12), medium for phosphorus (1.98, 1.81 and 1.93) and high fertility status for available K (2.93, 3.0 and 3.0), respectively. The available S were 72 %, 77 % and 76 % deficient in soils of Jintur, Selu and Pathri tahsils of Parbhani district.

**Table 1a. Physico-chemical characteristics and nutrient status of Jintur tahsil of Parbhani District**

Sr. No	Name of village	pH	EC (dSm <sup>-1</sup> )	OC (g kg <sup>-1</sup> )	CaCO <sub>3</sub> (g kg <sup>-1</sup> )	N (kg ha <sup>-1</sup> )	P <sub>2</sub> O <sub>5</sub> (kg ha <sup>-1</sup> )	K <sub>2</sub> O (kg ha <sup>-1</sup> )	S (mg kg <sup>-1</sup> )
<b>Jintur tahsil</b>									
1.	Ambarwadi	6.72-7.53 (6.95)	0.10-0.23 (0.15)	3.7-7.5 (5.6)	5.0-98.0 (38.6)	166.20-254.01 (213.87)	13.27-20.58 (15.67)	300.48-492.80 (429.60)	4.15-12.05 (8.20)
2.	Bamani	6.66-7.31 (6.88)	0.11-0.31 (0.16)	2.4-8.5 (5.7)	10-100 (68.6)	128.57-225.79 (184.39)	12.24-18.83 (15.36)	281.90-398.72 (351.18)	4.03-14.71 (7.50)
3.	Bhosi	6.89-7.67 (7.30)	0.11-0.27 (0.18)	2.2-8.1 (4.9)	48-138 (86.6)	134.84-279.10 (193.79)	11.11-17.28 (13.97)	337.12-1024.44 (614.30)	4.11-15.85 (10.02)
4.	Chandaj	7.05-7.71 (7.48)	0.15-0.65 (0.29)	4.8-9.3 (7.0)	54-120 (83.0)	119.19-225.79 (183.14)	11.31-18.83 (15.51)	364.64-1013.37 (627.14)	8.62-16.57 (13.32)
5.	Dahegaon	7.04-7.70 (7.45)	0.14-0.23 (0.17)	2.5-9.0 (6.1)	20.0-102.0 (78.4)	122.30-250.08 (176.70)	13.47-19.65 (16.62)	300.16-764.96 (497.14)	3.30-13.87 (7.74)
6.	Karanji	6.67-7.64 (7.11)	0.07-0.35 (0.25)	4.6-8.2 (6.8)	36.0-89.0 (60.6)	131.71-260.28 (205.71)	11.62-15.43 (13.24)	477.76-857.92 (671.90)	4.67-12.37 (7.74)
7.	Kausadi	6.98-7.76 (7.57)	0.41-1.31 (0.73)	5.2-7.5 (6.4)	71.0-100.0 (87.6)	116.25-200.70 (163.11)	10.70-14.71 (12.75)	591.62-993.60 (795.14)	6.81-17.01 (11.06)
8.	Korwadi	7.19-7.76 (7.46)	0.09-0.27 (0.17)	3.7-9.7 (5.9)	18.0-69.0 (47.0)	156.80-194.42 (173.73)	11.83-15.74 (13.92)	190.05-1205.12 (513.31)	6.0-12.82 (9.55)
9.	Kumbhari	7.45-7.63 (7.55)	0.19-0.38 (0.30)	3.3-6.6 (5.3)	10.0-80.0 (45.2)	144.25-235.20 (183.13)	11.31-19.34 (13.96)	396.48-720.83 (604.39)	6.57-14.19 (11.34)
10.	Mankeswar	6.90-7.70 (7.46)	0.11-0.32 (0.19)	2.2-8.2 (5.2)	50.0-92.0 (72.6)	166.25-210.11 (186.91)	9.26-14.81 (13.25)	334.88-753.76 (464.97)	5.52-11.41 (9.19)
11.	Marwadi	7.47-7.91 (7.76)	0.13-1.11 (0.45)	5.2-8.7 (6.5)	10.0-70.0 (38.0)	106.62-225.79 (157.81)	13.17-18.52 (15.12)	438.08-927.84 (661.24)	11.77-23.46 (16.93)
12.	Mathala	6.99-7.85 (7.50)	0.10-0.99 (0.34)	5.8-10.5 (7.5)	32.0-80.0 (50.0)	141.12-272.83 (191.29)	12.24-20.47 (15.22)	706.72-935.20 (799.04)	8.74-22.94 (14.86)
13.	Pangari	7.25-7.86 (7.63)	0.05-0.28 (0.17)	4.5-7.9 (6.0)	30.0-105.0 (57.0)	119.19-213.24 (174.99)	12.34-23.97 (16.48)	366.56-739.2 (516.67)	5.12-19.67 (11.56)
14.	Sankrala	7.41-7.68 (7.54)	0.07-0.46 (0.24)	3.3-9.0 (6.5)	40.0-160.0 (91.6)	175.32-235.20 (198.76)	11.83-21.53 (15.74)	311.58-569.76 (450.79)	3.06-12.09 (7.12)
15.	Varana	7.29-7.67 (7.56)	0.18-1.35 (0.53)	3.7-7.4 (5.4)	40.0-104.0 (80.0)	144.25-247.74 (203.85)	11.52-15.94 (13.31)	533.44-997.76 (718.48)	11.28-16.45 (13.47)
	<b>Total</b>	6.66-7.91 (7.41)	0.05-1.35 (0.29)	2.2-10.5 (60.0)	50-160 (65.6)	106.62-279.10 (186.08)	9.26-23.97 (14.67)	190.05-1205.12 (581.02)	3.06-23.46 (10.64)

**Table 1b. Physico-chemical characteristics and nutrient status of Selu tahsil of Parbhani District**

Sr. No.	Name of village	pH	EC (dSm-1)	OC (g kg <sup>-1</sup> )	CaCO <sub>3</sub> (g kg <sup>-1</sup> )	N (kg ha <sup>-1</sup> )	P <sub>2</sub> O <sub>5</sub> (kg ha <sup>-1</sup> )	K <sub>2</sub> O (kg ha <sup>-1</sup> )	S (mg kg <sup>-1</sup> )
<b>Selu tahsil</b>									
1.	Borgaon	7.37-7.97 (7.71)	0.13-0.32 (0.18)	4.2-6.7 (5.4)	37.0-70.0 (48.2)	137.98-398.27 (220.14)	7.20-14.82 (12.12)	306.72-1291.36 (992.51)	10.36-12.41 (11.52)
2.	Dasala	7.28-7.71 (7.51)	0.14-0.31 (0.22)	2.7-6.0 (4.3)	41.0-71.0 (56.0)	106.62-222.65 (165.58)	10.29-12.35 (10.86)	708.96-1125.60 (968.35)	9.39-11.20 (10.53)
3.	Gohegaon	7.38-7.66 (7.56)	0.12-0.22 (0.16)	2.8-7.3 (4.9)	43.0-96.0 (60.0)	119.19-244.60 (187.51)	9.26-16.47 (12.43)	595.36-995.38 (736.72)	9.87-12.74 (11.50)
4.	Hadgaon	7.06-7.62 (7.44)	0.15-0.27 (0.18)	3.7-9.6 (6.9)	40.0-66.0 (55.0)	94.08-175.32 (133.53)	8.23-14.41 (11.85)	870.24-1201.76 (1025.92)	10.72-12.90 (11.68)
5.	Kajali rohina	7.59-8.16 (7.90)	0.19-0.33 (0.26)	1.5-4.0 (2.3)	25.0-80.0 (58.4)	175.61-194.43 (182.51)	8.34-12.15 (9.84)	487.36-929.60 (740.38)	10.16-13.06 (11.47)
6.	Kanhad	7.35-7.74 (7.64)	0.16-0.33 (0.21)	1.5-5.5 (3.5)	28.0-40.0 (32.8)	100.35-222.65 (181.25)	7.99-18.26 (10.52)	305.76-927.36 (545.68)	10.8-13.22 (12.07)
7.	Kharadgaon	7.32-7.80 (7.53)	0.19-0.53 (0.35)	2.2-13.9 (7.3)	30.0-70.0 (51.2)	72.12-241.47 (191.92)	14.41-22.65 (17.19)	588.0-1137.92 (926.24)	12.17-13.82 (13.05)
8.	Kundi	6.75-8.30 (7.68)	0.14-0.52 (0.25)	1.8-3.4 (2.5)	15.0-83.0 (53.6)	159.93-279.10 (208.22)	10.19-19.56 (14.51)	309.28-1077.44 (746.40)	8.10-11.96 (10.84)
9.	Mhalsapur	7.52-7.68 (7.60)	0.13-0.28 (0.19)	2.2-6.6 (3.5)	30.0-52.0 (43.4)	156.80-213.24 (183.13)	9.84-13.38 (11.33)	724.64-1092.0 (900.03)	10.32-11.97 (11.29)
10.	Radhe dhamangaon	7.01-7.78 (7.53)	0.16-0.23 (0.20)	0.9-8.5 (3.5)	31.0-80.0 (52.2)	197.56-254.01 (227.67)	8.39-13.38 (11.07)	492.48-879.21 (639.71)	11.28-13.2 (11.94)
11.	Raja	6.78-8.01 (7.64)	0.20-0.55 (0.31)	2.2-7.5 (4.8)	58.0-81.0 (70.4)	181.88-235.20 (202.58)	9.26-20.49 (14.04)	355.2-846.72 (631.42)	9.99-14.91 (11.97)
12.	Rajwadi	7.69-8.60 (8.04)	0.19-1.02 (0.42)	3.3-8.2 (5.2)	55.0-70.0 (60.6)	72.12-216.38 (159.58)	9.37-16.88 (12.43)	453.28-858.72 (673.24)	11.77-12.90 (12.20)
13.	Rawalgaon	7.34-7.76 (7.54)	0.16-0.86 (0.32)	0.7-7.5 (3.5)	50.0-61.0 (54.8)	106.62-200.70 (174.26)	10.29-12.35 (11.32)	731.36-1088.64 (914.14)	10.88-12.70 (11.70)
14.	Sonna	7.12-7.76	0.28-0.56	4.8-9.7	20.0-170.0	40.76-210.11	11.01-21.96	716.56-956.72	9.99-17.53

		(7.46)	(0.41)	(7.2)	(66.4)	(139.86)	(15.30)	(852.38)	(13.69)
15.	Tandulwadi	7.59-7.89 (7.71)	0.15-1.01 (0.41)	1.5-7.5 (4.9)	5.0-64.0 (37.4)	141.12-250.88 (196.31)	10.50-23.37 (16.86)	576.32-987.84 (815.10)	12.45-18.02 (14.51)
	Total	6.75-8.60 (7.63)	0.12-1.02 (0.27)	0.7-13.9 (4.6)	5.0-170 (53.3)	100.35-398.27 (193.94)	7.20-23.37 (12.78)	305.76-1291.36 (807.21)	8.10-18.02 (11.10)

Table 1c. Physico-chemical characteristics and nutrient status of Pathri tahsil of Parbhani District

Sr. No.	Name of village	pH	EC (dSm <sup>-1</sup> )	OC (g kg <sup>-1</sup> )	CaCO <sub>3</sub> (g kg <sup>-1</sup> )	N (kg ha <sup>-1</sup> )	P <sub>2</sub> O <sub>5</sub> (kg ha <sup>-1</sup> )	K <sub>2</sub> O (kg ha <sup>-1</sup> )	S (mg kg <sup>-1</sup> )
Pathri tahsil									
1.	Babhalgaon	7.70-7.93 (7.77)	0.12-0.44 (0.27)	3.3-8.2 (6.6)	35.0-145.0 (115.0)	144.25-247.70 (196.94)	7.31-14.31 (12.22)	458.08-1217.44 (799.0)	9.19-12.29 (11.07)
2.	Borgaon	7.13-7.70 (7.50)	0.16-0.60 (0.36)	4.9-8.5 (6.4)	51.0-106.0 (69.6)	127.39-260.28 (182.90)	7.82-20.69 (12.31)	391.20-869.12 (684.19)	7.09-11.97 (9.63)
3.	Devgaon	7.28-7.61 (7.46)	0.13-0.28 (0.22)	3.6-9.2 (5.7)	25.0-85.0 (50.4)	147.39-210.11 (178.75)	10.10-18.94 (14.93)	318.08-1190.56 (634.36)	8.95-11.98 (10.04)
4.	Devnandur	7.45-7.71 (7.56)	0.22-0.64 (0.46)	7.2-9.7 (8.6)	10.0-110.0 (69.8)	114.25-219.52 (176.71)	11.53-20.08 (15.64)	563.36-1080.80 (799.90)	13.82-19.51 (15.81)
5.	Dhalegaon	7.48-8.04 (7.78)	0.18-1.05 (0.43)	3.9-9.4 (6.8)	39.0-75.0 (62.4)	159.93-266.56 (207.60)	11.32-19.56 (15.85)	531.68-878.08 (737.63)	8.34-11.75 (9.57)
6.	Gunj	7.31-7.93 (7.62)	0.09-0.38 (0.23)	2.7-7.0 (5.3)	35.0-85.0 (68.0)	178.85-313.60 (243.32)	9.78-17.30 (13.03)	364.0-982.24 (591.04)	9.02-12.09 (10.99)
7.	Jaitapurwadi	7.45-7.97 (7.72)	0.19-0.66 (0.34)	3.8-7.6 (6.2)	56.0-94.0 (77.0)	141.12-225.79 (189.41)	12.66-16.27 (13.81)	806.40-969.92 (862.40)	5.4-9.95 (7.89)
8.	Loni	7.72-7.99 (7.84)	0.10-0.29 (0.21)	6.3-9.7 (7.7)	65.0-100.0 (80.8)	134.84-254.01 (181.25)	12.36-13.59 (13.03)	610.40-1038.24 (879.64)	9.35-12.53 (11.04)
9.	Maliwada	6.70-7.77 (7.47)	0.61-1.56 (0.88)	4.5-8.5 (6.4)	13.0-95.0 (71.2)	147.39-263.42 (211.36)	12.87-24.61 (19.16)	449.28-908.48 (629.15)	12.62-18.3 (15.73)
10.	Masala khurd	7.36-8.12 (7.67)	0.17-0.49 (0.27)	3.7-9.2 (7.1)	45.0-120.0 (83.0)	144.25-238.33 (190.05)	12.97-16.78 (14.55)	414.40-890.40 (700.0)	8.15-12.46 (10.17)
11.	Rampuri	7.57-8.18 (7.80)	0.15-0.91 (0.40)	3.4-7.5 (5.8)	40.0-135.0 (91.4)	153.66-260.28 (203.22)	12.66-24.61 (16.18)	581.28-1285.76 (889.28)	10.48-19.35 (14.10)
12.	Sarol khurd	7.43-8.10 (7.65)	0.12-0.38 (0.23)	3.5-9.6 (6.0)	50.0-94.0 (73.4)	166.20-244.60 (210.73)	14.10-21.11 (17.85)	437.92-997.92 (797.34)	8.38-14.95 (11.94)
13.	Takalgavhan	7.51-7.79 (7.61)	0.22-0.70 (0.39)	4.0-9.7 (7.0)	35.0-95.0 (76.0)	147.39-228.92 (193.17)	11.22-15.75 (13.21)	595.84-1024.80 (836.41)	11.43-21.97 (16.10)
14.	Tura	7.44-7.77 (7.63)	0.17-0.57 (0.41)	3.7-9.0 (6.6)	32.0-99.0 (64.0)	144.25-188.16 (167.45)	10.40-19.87 (16.37)	629.44-917.56 (796.24)	9.04-12.71 (10.37)
15.	Wadi	7.63-7.83 (7.72)	0.20-0.49 (0.30)	5.2-9.7 (7.6)	46.0-94.0 (74.2)	131.71-323.0 (215.12)	9.88-16.88 (13.75)	361.76-719.68 (558.08)	7.45-15.03 (10.35)
	Total	6.70-8.18 (7.65)	0.09-1.56 (0.36)	2.7-9.7 (6.6)	10-145 (75.0)	114.25-323.0 (200.37)	7.31-24.61 (14.79)	318.08-1285.76 (746.31)	5.40-21.97 (11.69)

Table 2a. Nutrient Index values of Jintur, Selu and Pathri tahsils of Parbhani district.

Sr. No	Available Nutrients	Jintur		Selu		Pathri	
		NIV	Category	NIV	Category	NIV	Category
1	Nitrogen	1.06	Low	1.06	Low	1.12	Low
2	Phosphorus	1.98	Medium	1.81	Medium	1.93	Medium
3	Potassium	2.93	High	3.0	High	3.0	High
Deficiency of available sulphur							
-	Available Nutrients	Deficient %	Sufficient %	Deficient %	Sufficient %	Deficient %	Sufficient %
1	Sulphur	72	28	77	23	76	24

**Correlation:** The correlation between available nutrients and soil properties of soils of Northern tahsils (Jintur, Selu and Pathri) presented in Table (3). Significant positive correlation ( $r = 0.180^*$ ) was found between organic carbon and available Nitrogen, as most of the soil Nitrogen is in organic form. The result was in confirmatory with the finding of Meena *et al.* (2006). The positive significant correlation was found between Nitrogen and CaCO<sub>3</sub> ( $r = 0.143^*$ ). Similar result was reported by Mohamad *et al.* (2012). The available phosphorus positively correlated with electrical conductivity ( $r = 0.187^{**}$ ). Similar result was reported by Vishwanath Shetty *et al.* (2008). A significant positive correlation was found between available phosphorus with organic carbon ( $r = 0.255^{**}$ ) it might be due to the presence of more than 50% of phosphorus in organic forms and after the decomposition of organic matter as humus is formed which forms complex with Al and Fe and that is a protective cover for P fixation with Al and Fe thus reduce phosphorus adsorption or phosphate

fixation (Tisdale *et al.* 1997). A significant positive correlation was found between available potassium with EC ( $r = 0.142^*$ ). This was attributed due to facts that interlayer collapse of clay mineral structure. Similar results were observed by Waghmare *et al.* (2009) and positive relationship was observed between organic carbon and available potassium. This might be due to creation of favorable soil environment with presence of high organic matter. The available sulphur in the soil was positively and significantly correlated with electrical conductivity ( $r = 0.353^{**}$ ) and organic carbon ( $r = 0.152^*$ ). Similar results were observed by Mali and Raut (2001).

**Table 3. Correlation between the physico-chemical properties and available nutrients in soils of Jintur, Selu and Pathri tahsils of Parbhani district**

\*

Available Nutrients	Physico-chemical properties			
	pH	EC	O.C	CaCO <sub>3</sub>
N	-0.137	0.022	0.180*	0.143*
P	-0.033	0.187**	0.255**	0.101
K	0.048	0.142*	0.132	0.003
S	0.009	0.353**	0.152*	0.039

Significant at 5% level , \*\*Significant at 1% level

#### IV. CONCLUSIONS

It can be concluded that, the soils of northern tahsils (Jintur, Selu and Pathri) of Parbhani district are neutral to alkaline in soil reaction, safe in electrical conductivity, low to high in organic carbon content and non-calcareous to calcareous in nature. According to the concept of soil nutrient index soils are low in the available N, medium in P, high in K and deficient in S content.

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