

Effect of Chemicals in Molasses on Soil in Vicinity of Sugar Factory**Dighe Amar Balasaheb**Department of Chemistry, Sangamner Nagarpalika Arts, D. J. Malpani Commerce and B. N. Sarda Science
College Sangamner -422605, Ahmednagar, (MS), India.Email – amardighe15@gmail.com**ABSTRACT -**

In the present Study attempts have been effect of chemicals in molasses on soil from Ghulewadi – maldad area, Sangamner Dist- Ahmednagar, Maharashtra 20 surface soil sample were analysed for various parameter like pH, EC, available Nitrogen, Phosphorus, Potassium, Calcium Carbonate, Calcium, Magnesium, Organic carbon and Boron. The pH is most important factor in the fertility. The optimum pH value of soil must be between 7-8 which makes neutral or slightly alkaline. Soil between pH 8.5 – 10 is said to be non – saline.

The soil shows low content of available Nitrogen, Phosphorus & potassium. The soil fertility depends on nitrogen fertilization through organic manure, farm yard manure (fym) are required to overcome that adverse effect. Complementary use of bio-fertilizer organic manure in suitable combination of chemical fertilizer. Organic manure in suitable combination of chemical. Fertilizers were suggested. Awareness camps, rallies and training programs can be arranged for farmers reading the benefits of balanced use of chemical fertilizers and use of organic agriculture in crop production in improving soil fertility and nutrition.

Keywords: - Soil fertility, available nutrients, organic matter, critical limits.

INTRODUCTION –

Today's progression agriculture, science and technology make it possible for our nation to achieve its current level of scientific and technological excellence and its higher Standard of living. The great challenge facing mankind in 21st century is to produce basic necessities of food, feed, fibre and fuel. One of the factors of meet these requirements to same extent is to improve the agriculture's yield. Extent is to improve the agricultural yield. Increase of farm production and steady increases in the yield of crop per hectare are necessary to meet population's requirement for sufficient amount of high-quality foodstuffs, fuels and raw material for certain agricultural industries. Agriculture technologies that leads to green revolution resulted in the degradation of this precious natural resource to over exploitation under intensive irrigation and cultivation with mis-management.

The Ghulewadi – Maldad and Sangamner area is experiencing the problem of salination, alkylation, due to over irrigation excess use of chemicals, fertilizers, intensive cultivation with modern production technology and establishment of sugar cane and allied industries. Therefore, attempts have been made to study the chemical characteristics and their classification of this soils properly. Study area the Sangamner area is located in the near of sugar factory is back side area of AVCOE College of Sangamner. Agriculture is the world's biggest most important industry which provides us with almost all basic needs food, clothing and shelter. The soil is most important role of life on the earth. As human population continues to increase, human population continues to increase. Human distribution of the earth's ecosystem of produce food and fiber will place greater demand on soil to supply essential nutrients. Therefore, one of the fiber will place greater demand on soil to supply essential nutrients. Therefore, one of the fiber will place greatest challenges today is to develop and implement soil crop and nutrients management technology that enhance the plant productively and the quality of soil water and air. The industrial units are developed in the area generated large volumes of water which mixing with surface and ground water resources containing them. The nearby Sangamner area is experiencing the problem of salination,

alkalinisation, waterlogging etc due to over irrigation and establishment of sugarcane and allied industries Therefore, attempts have been made to evaluate the soil fertiling status of the study area.

Study Area:

The Sangamner area is located in the Ahmednagar district of Maharashtra Sangamner is a Taluka Which is located at distance of 150km from Pune and 70km from Nashik on Pune- Nashik National Highway No.50 The Industrial units developed in the areas generate large volumes of waste water which mixes with surface and groundwater resources there by contaminating them. At places, the lagoons used for storage of waste water have caused degradation of soil as water due to infiltration of effluents.



fig: - location map showing soil sampling station in the study area.

The Climatic and all other factors must be taken into considerations in studying the interrelation between plants, soil and fertilizer.

EXPERIMENTAL -

proper sampling tools are essential for collection of good soil samples. screw type and post-hole augers are generally used for this purpose. selected 20 surface soil samples (0-20 cm) were collected in cloth bags as per the standard procedure. A quartering technique was used for preparation of soil samples. The samples were dried in air and passed through 2mm sieve and stored in cloth bags. The soil pH and EC were determined from the saturation extract (1:5 soil water ratio) of soil (Digital pH meter & Conductivity). Organic carbon was estimated by Walkley and Black method, the available Nitrogen (Alkaline permanganate method), available phosphorus (Olsen's method) available potassium (flame photometer method) the Boron was determined by Atomic Absorption spectroscopy method, calcium or magnesium by EDTA (versenate) method, calcium carbonate in soil by rapid titration method were Estimated by standard procedures.

RESULTS AND DISCUSSION -

For evolution of soil fertility status of the study area pH, EC, organic carbon, available Nitrogen, Potassium, Phosphorus, Calcium, magnesium, calcium carbonate and Boron from the soils were determined and results obtained are presented in Table – 1

Category	Organic Carbon
Low	< 0.50
Medium	0.50 to 0.75
High	>0.75

Table No. 1 classification of soils on the basis of organic carbon content form study area.

Soil pH –

The reaction of an aqueous solution represents the degree of acidity or basicity caused by the relative strength concentration of H^+ ions present in its values varies from 0 to 14. It is neutral at 7. Below 7 it is acidic and above 7 it is alkaline. Soil having pH range 6.0 to 8.5 are considered neutral. It influences crop growth both directly and indirectly. Many plants grow well in neutral soil. The need of fertilisers depends on soil reaction. The supply of plant nutrient and thus the fertility of the soil are affected by pH. The solubility of most nutrient varies in response to pH. Acidity increases the loss of nutrient by leaching and the availability to plant decreases. The quantity of some nutrients may rise so greatly under acidic and alkaline nature of soil. The higher value of pH is recorded (Samples no. $S_5, S_6, S_7, S_8, S_9, S_{10}, S_{18}, S_{19}, S_{20}$).

Electrical Conductivity –

The salt content present in given soil can be estimated by electrical conductance measurement on a saturated soil paste more dil. Suspension of soil in water. Amount of total soluble salt present in water is generally expressed in term of electrical conductivity of sample. It is more suitable for salinity measurement because it increases with salt content. The higher value of EC has been obtained from (Sample No. $S_4, S_2, S_7, S_8, S_9, S_{10}, S_{18}, S_{19}, S_{20}$).

Organic Matter -

Plant and animal matter consist of organic material in various stages of decay, many organisms also live in soil. These soil organisms include plant roots, microbes and animals such as worms, insects and small mammals. Bacteria, fungi and other microbes decompose dead plant and animals. Decaying organic material releases nutrient into the soil. Some organic material combines with mineral particles where other decaying material forms organic soil particles called humus. The organic matter is a vital store of available nutrients. It helps to sustain soil fertility by improving soil structure, retention of mineral nutrients, increasing water holding capacity, water infiltration, drainage, aeration and root penetration. It also helps to increase the amount of soil flora and fauna. The organic matter is an important contributor to soil fertility. The soil from the study area are classified on the basis of their carbon content into the different categories such as low, medium and high. In general, majority of the soil in the area have low to medium carbon content. That is to say that these soils require adequate nitrogen fertilization through organic manure, farmyard manure, green manure etc. Similar observation was reported.

Table No.2-Soil Fertility Parameter of the Soil from Sangamner Area.

Sr No	pH	EC	OC %	N	P	K	Ca^{2+}	Mg^{2+}	$CaCO_3$	B
S_1	7.9	0.408×10^{-3}	0.52	12.2	102	102	32.2	55.2	6.2	0.661
S_2	8.6	0.905×10^{-3}	0.18	805	88.2	88.2	24.2	48.2	4.8	0.0107
S_3	8.5	1.020×10^{-3}	0.48	602	72.2	72.2	18.4	32.2	9.2	2.670
S_4	8.9	2.272×10^{-3}	0.64	11.2	63.6	63.6	16.2	30.4	8.8	0.150

S ₅	9.3	2.508×10 ⁻³	0.26	3.2	52.2	52.2	19.3	38.6	12.2	0.988
S ₆	9.0	2.905×10 ⁻³	0.22	1.8	35.2	35.2	12.8	22.6	14.8	2.019
S ₇	9.2	2.572×10 ⁻³	0.34	202	39.8	39.8	8.4	15.2	11.2	3.025
S ₈	9.1	2.435×10 ⁻³	0.28	4.4	20.8	20.4	8.2	15.0	15.3	2.018
S ₉	8.9	2.272×10 ⁻³	0.30	3.5	20.4	28.2	6.2	11.2	16.2	3.065
S ₁₀	8.8	2.182×10 ⁻³	0.42	3.6	28.2	30.3	8.1	31.2	12.4	6.022
S ₁₁	7.8	0.398×10 ⁻³	0.78	12.3	30.3	104	30.2	56.2	6.7	0.019
S ₁₂	8.2	0.602×10 ⁻³	0.72	9.5	104	88.4	28.6	52.2	5.2	0.062
S ₁₃	8.4	0.808×10 ⁻³	0.74	8.7	88.4	78.2	26.2	48.4	6.8	0.270
S ₁₄	8.1	0.579×10 ⁻³	0.62	9.2	78.2	69.6	19.4	38.2	7.2	0.250
S ₁₅	8.5	0.860×10 ⁻³	0.50	11.2	69.6	62.6	22.4	32.4	6.2	5.672
S ₁₆	8.9	2.220×10 ⁻³	0.52	2.4	62.6	38.2	14.3	16.2	8.4	6.026
S ₁₇	9.0	2.920×10 ⁻³	0.38	3.6	38.2	36.2	12.2	18.2	12.8	2.012
S ₁₈	9.3	2.225×10 ⁻³	0.36	4.2	36.2	26.2	9.4	15.2	14.2	0.088
S ₁₉	9.1	2.432×10 ⁻³	0.44	3.8	35.2	35.2	7.2	11.8	16.9	3.096
S ₂₀	9.2	2.670×10 ⁻³	0.32	2.8	28.4	28.4	6.4	12.4	13.4	2.012

Available Nitrogen -

Nitrogen promote rapid growth, increase leaf size and quality crop maturity and promotes fruit and seed development nitrogen is an essential plant nutrient. It should be present in the soil in appropriate proportion for the growth of plants.

The plant absorb nitrogen either as ammonium or as nitrate ion's the transform of nitrogen compound in the soil involve the process such as fixation of atmospheric nitrogen by free living and nodule forming bacteria conversion of nitrogen containing compound into humic acid, ammonification, nitrification & denitrification. Deficiency of nitrogen is almost universal in Indian soils; the results were presented in table No.1 the available nitrogen from the soil ranges from the 50.0 -150kg/ha. It shows the soil from the area have low nitrogen status. These rating limits are increase of crops or soils. Critical limits for soil test values.

Available Phosphorus-

Normal plant growth cannot be achieved without phosphorus it is involved in various biochemical reaction like metabolism of carbohydrates, fats and proteins phosphorus has been called the master key to agriculture-because low crop product more often due lack of phosphorus then he deficiency of other element expect Nitrogen. It is essential for growth of cell division, root growth fruit development and early repining. It also required for energy storage and transferred. It is constituents of several organic compound including enters the soil solution either phosphate ion's enters soil solution either as a result of mineralization of organophosphate or the application of fertilizers. The plant takes available phosphorus mostly in the form of H₂PO₄ from soil solution in the present study low status of available phosphorus was found nearly in all the soil in the area.

Available Potassium-

Potassium exist in k⁺ form and its function appear tubecatalytic in nature. The potassium is important for plant because it participates in the activation large no of enzyme. Which are involve physiological process of plant. Its control's the water economy & provides the resistance against a number of pest's diseases and environmental stresses. Potassium is a master of nutrient for the production of superior quality crop. The available kin the soil range from 45 to 300 kg/ha. Soil testing provides information regarding nutrients availability in soils which the basis for the fertilizer recommendation for maximum crop yield.

Table No-3: Rating limits for soil test values used in India.

Nutrients	Low	Medium	High
Available Nitrogen (kg/ha)	< 280	208-560	>560
Available Phosphorus (kg/ha)	<10	10-24.6	>24.6
Available Potassium (kg/ha)	<108	108-280	>280

Available Calcium-

It is essential element for plant growth. It is found in almost all-natural waters, soil, plant, tissue and animals' bones. Calcium rich water is desirable. Calcium is absorbed by plants in the form of bivalent Ca^{2+} ions. In which calcium also have various type of role therefore calcium is constituents of the cell wall and increases stiff of plant. Calcium accumulation during respiration by mitochondria. It is promoting early root development and growth of plant and calcium encourages seed production. Calcium deficiency Symptoms appears in the meristem regions of leaves, stem, bud and roots. Calcium deficiency in generally an indication of the need of lime.

Available Magnesium-

Mg is absorbed by plants in the form of Mg^{2+} ions. The absorption takes place from the soil solution and by the mechanism of cation exchange. Magnesium is a constituents of chlorophyll molecule. Which is the driving force of photosynthesis. It imparts dark green colour in leaves. Magnesium activities the formation polypeptide chains of amino acids.

Magnesium also serves as a structural component in ribosomes. Magnesium also plays an important role of carbohydrates formation, fats and vitamin etc. It has increased the affinity of enzyme for carbon dioxide. The prenominal symptom is interveinal chlorosis. The bottom leaves are always affected first. The magnesium deficiency is the common cause of 'grass tetany' in ruminant animals like cows, deer's etc. animals.

Boron-

Boron is an enzyme, activator and is involved in the production of starch required for building up soil. Boron is typical and important trace element. Orthoboric acid CH_3BO_3 and its salts. Are the main form of boron present in the soil. Several factors including soil pH, calcium, soil texture, organic matter, light and moisture are known to influence the availability level of boron in soil.

The boron greatly influences the metabolism and transport of carbohydrates in plant. It is also involved in membrane integrity and cell wall development, which affect permeability, cell division and cell extension. Boron deficiency like calcium affects the growing points. Of roots, shoots and young leaves. Boron deficiencies reduce the uptake of calcium. The excess lime. Might reduce, the take of calcium because boron deficiency. The excess of boron in food product may harm human health. Deficiency of boron Part also observed in the upstream part and in the non-irrigated region.

Table no. 4 classification of soil based on boron concentration from study area.

Class	Boron was	No. of samples and location.
Safe	< 0.7	S ₁ , S ₂ , S ₃ , S ₁₁ , S ₁₂ , S ₁₃
Marginal	0.1 to 1.5	S ₄ , S ₁₈
Unsafe	>1.5	S ₃ , S ₆ , S ₇ , S ₈ , S ₉ , S ₁₀ , S ₁₅ , S ₁₆ , S ₁₇ , S ₁₈ , S ₁₉ , S ₂₀ .

CONCLUSION

The study evolution of soil fertility status revealed that the soil from study area is alkaline in nature with pH range 7.8 to 9.2. The electrical conductance of soils is found to be higher in order to understand the chemical characteristics of soil from their near of sugar factory i.e. Ghulewadi - Maldad area backside of AVCOE college. Chemical properties like pH, electrical conductivity, organic carbon, nitrogen, phosphorus, potassium, calcium, magnesium, calcium carbonate and Boron.

In which produced critical for growth salt sensitive crop the available of nitrogen and phosphorus in the soil low category. In this CaCO_3 content higher concentration CaCO_3 . This observed more percentage CaCO_3 among soluble calcium in higher percentage observe this area. Badly effect on plant growth. Under this approach the best available option lies in the complimentary use of bio-fertilizer, organic, mature in soluble combination of chemical fertilizer in soluble combination of chemical fertilizer the camp rallies and training program for the formerly should be arranged for increasing awareness reading the benefit of organic agriculture, bio fertilizers etc. in crop production and thereby improving soil fertility and nutrient status.

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