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SOIL PROPERTIES AND COTTON (*GOSSYPIUM HIRSUTUM* L.) PRODUCTION UNDER DIVERSE SOURCES OF ORGANIC AMENDMENTS IN SIBI, BALOCHISTAN

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A B S T R A C T

The Province of Balochistan has an extensive geographical area facing numerous soil-related issues with poor soil fertility, soil salinity, soil erosion, and low contents of organic matter contents. The current organic amendments in cotton crops and intensive farming are further promoting the mentioned problems. The study was conducted with the following objectives (1) To evaluate the soil properties under different organic amendments in cotton fields (2) To assess the soil fertility and organic matter contents and identify the soil health and fertility of soil. (3) To estimate the cotton production under organic amendments. A field experiment was conducted including the treatments i.e Farm Yard Manure (FYM), Poultry Manure (PM), and Green Manure. Different levels of organic amendments were applied i.e FYM@20 kg that contained (0.5 % N, 0.2 % P_2O_5 and 0.5 % K_2O), PM@ 20 kg per plot (3.03 % N; 2.63 % P2O5 and 1.4 % K2O), Green Manure@ 10 Kg (Mixed Dhancha with Guar, and solar hemp (N, 7.9 %, P 2.2 %, k 1.9). Organic amendments significantly affected root morphology and physiology by improving soil nutrients and also soil properties. Furthermore, morphological and physiological parameters increased with 5 % organic manure, 6 % poultry manure, and 4% in green manure. A significant improvement in soil properties, increased in crop biomass production and yield of crops was noted with an increase in soil nutrient content at the bud stage and a positive relationship between root physiologies.

Keywords: Organic matter, Cotton, Particulate organic carbon, Tillage.

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INTRODUCTION

Pakistan is one of the historic domestic of cotton. The earliest recognized cotton lines in Pakistan had been "cotton seeds" determined from Mehrgarh (Bolan) close to Quetta, which was as vintage as approximately 5000 BC. From here it unfolds to the Indus Valley, Harappa, Balakot, and different elements of the country. At gift, Pakistan is the fifth biggest producer of cotton and the third biggest patron producer of cotton yarn within the international. Approximately 1.3 million out of five million farmers domesticate cotton on an area of 6.0 million acres, overlaying 15% of cultivated locations inside the USA. Cotton Crop has 0.8 % in GDP and contributes 5-2% in agriculture price addition. Cotton has a 51 % share in the total foreign exchange profits of the USA. The notable boom in cotton manufacturing facilitated the emergence of a large and vibrant fabric industry with over 1000 ginning factories, 400 fabric generators, 7 million spindles, 27000 looms in the mill area, over 25000 looms in the non-mill zone, 700 knitwear units, 4000 garment devices, nearly 1000 ginners, and 5000 oil expellers making cotton enterprise the maximum crucial quarter of the economic system of Pakistan (Abdullah et al., 2016; Nawaz et al., 2019; Sahito et al., 2016).

Cotton seed oil is largely composed of unsaturated fats about 70%, and excessive tiers of anti-oxidants along with vitamin E that contribute to its lengthy shelf life. Cotton has about 70% proportion of locally produced fit for human consumption oil in Pakistan. Cotton seed cake is one of the major assets of livestock feed to beautify milk manufacturing in Pakistan. Even the stalk of the cotton plant is used as a fuel in rural regions, to broaden ethanol in diesel or petrol blends and to enhance soil organic count number. Cotton is referred to as white gold and is seen as an important cash crop aimed toward capturing the Pakistani financial system (Abdullah et al., 2016; Sahito et al., 2016). Cotton is grown globally as an important fiber plant in more than 60 countries (Nawaz et al., 2019). *Gossypium hirsutum* L. bills for approximately 90 % of world cotton production, accompanied by way of different kinds of tetra pod *G. barbadense* L., and both also are known as new world cotton (Shao et al., 2016).

In Pakistan, the rural region is a vital economic thing with an expected percentage of 19 % in international productivity (GoP, 2019). But, the performance of the agricultural region isn't always as right as it can be under various constraints. Then again, the share of the agricultural sector in GDP decreases over time. Cotton is a famous cash crop and is a source of raw materials for the fabric enterprise, the price is constantly growing. Cotton bills for 5.2% of additional agricultural costs and 1% of Gross home Product GoP (2019). Cotton is an important crop help to the textile industry and is one of the most vital providers of the US economic system. Pakistan ranks fourth in cotton manufacturing even as the 1/3 largest consumer inside the globe (GoP, 2019). The best cotton production depends on soil, climate, and provided inputs.

Soil is a fundamental natural resource, the unconsolidated part of the earth's crust that acts as a natural habitat for the earth's vegetation (Soil Technological know-how Society of the US 2001). Soil is the medium of plant boom, and plant growth is influenced by a ramification of bodily, chemical, and organic retailers in the soil in addition to organic residues. Chemical residences of soil manipulate the solubility and bioavailability of critical flower vitamins. Soil organism’s plants, e.g. algae, fungi, and microorganisms: fauna and, e.g. Nematodes, arthropods, earthworms, and molluscs. Soil organic matter play an important role for improvement of soil properties and quality cotton production.

Soil organic matter (SOM) in the cotton crop performs an essential role in influencing the soil’s distinct physical, chemical, and organic properties. Being incredibly fertile soils with a clay content of above 50% in conjunction with high moisture conservation capability, these soils are broadly utilized for cotton production. However, research and information on the effect of organic waste on at the such soils used for irrigated cotton is limited, with few recommendations to help involved farmers. Research spotlights that using numerous organic amendments, which aren't only beneficial for irrigated cotton production but also necessary for the improvement of soil quality, soil structurally stability and nutrient availability. However, they are very resilient and might expand desirable structures after only a few cycles of wetting and drying (Wander, 2004).

Keeping in view the current situation of the application of organic fertilizers, the experiment was conducted to evaluate soil properties under different organic amendments in cotton fields as well as to assess soil fertility and organic matter contents and identify the soil health and fertility of soil and cotton production under organic amendments.

MATERIALS AND METHODS

Organic amendments in soil under different cotton varieties under high semi-arid conditions of district Sibi Baluchistan were carried out at villages Khajjak and Kurak, situated at latitude 29.36 N and longitude 67.59 E and an altitude of 138 m, 452ft above sea level. Sibi has an arid temperature zone.

Climate Condition

Sibi has globally recorded extremely high temperatures, in particular within June with a mean of 52 °C in the afternoon. Precipitation is light and particularly falls in awesome periods: early spring in March and April, and at some stage in monsoon season in July and August. The climatic and topography of Sibi District are pretty varied as compared to different districts of Balochistan. It is also referred to as the "hot spot" of Pakistan wherein the temperatures in the summertime exceed 52.6 °C (126.7 °F). Annual Precipitation-Effectiveness Index of Pakistan 6.2 over 50 year’s length (1959-2008). In Balochistan excluding Quetta and Zhob, generally index values are increasing from the west (1.8 for Nokkundi) to the east (6.2 for Sibbi). Annual precipitation of district Sibi is 6.2 mm (inches), monsoon 2.6 mm, winter 2.2 mm, pre-monsoon (April to June) is 0.8mm and post-monsoon (October –December) is 0.5 mm. Soil pH of the Sibi region falls under the range of less than 8.5 EC concentration in Sibi region average soil EC falls 1.3 dS/m. Most of the Sibi region soil falls under sandy loamy because of hot climatic conditions, and high temperatures. The running abrasion of soil nutrients in river Nari the soil status of Sibi region is a fertile land. The

temperature of the Sibi region falls in the summer average of 51. °C. Low moisture content in the soil due to high temperature.

Experiment Site

The soil samples were taken during sowing to harvesting stages in the years of 2020 and crop samples were taken at the time of harvesting. Experiments site villages Khajjak and Kurak in district Sibi. The experiment was under Randomize Complete Block Design (RCBD).

The randomized sample was taken from each plot during the sowing to harvesting stages and prepared for the analysis of soil properties. Crops sample was taken at the time of harvesting and prepared for crop analysis.

T0 (Control): No organic matter or other treatments included

T1 (FYM): Applied 20 kg per plot, (FYM contains 0.5 N percent, 0.2 percent P2O5 and 0.5 percent K2O).

T2 (poultry Waste): Applied 20 kg per plot. Contains 3.03 percent N; 2.63 percent P2O5 and 1.4 percent K2O

T3 (green manure): (Dhancha, Guar and Sunhemp contain N, 7.9%, P 2.2%, K 1.9. Applied 20 kg of GM per plot with three replications.

Crop on Ridges

The crop was sown on ridges in plots. Seed rates were used 5-6 kg, row-row distance was 60–75 cm and plant-to-plant distance 15–20 cm respectively. T0 plot planted same like covnetional farmer with no application of fertilizer Dosage of T1 was 10 kg FYM , T2 was poultry waste 10 kg, and T3 using green manure 10 kg at the time of soil preparation and in before harvesting.

Soil Sampling and Preparation

Soil samples were taken under different treatment during the experimental year at different stages. Sample were taken through soil augur at 0-20 cm soil depth during crop sowing and harvesting time for measuring of different soil parameters which included, Soil pH, EC, Soil Moisture, Organic matter, Total organic carbon, mineral associated organic carbon. Particulate organic carbon, Microbial biomass carbon.

Soil pH was determined via 1: 2 solutions (soil: water). For this motive, 10 g soil was taken right into a beaker after which 20 ml distilled water added. The suspension was mixed with a tumbler rod and allowed to repeat each 10 minutes three times. After 1/2 an hour the pH meter electrodes had been blended in suspension and readings had been recorded (McLean, 1982).

Electrical conductivity (EC) of soil samples was determined through a 1:5 soil suspension (soil and water). Five grams of soil have been located in a 50 mL beaker and 25 ml of water become delivered. The EC Electrode meter (DDS-12DW) was inserted inside the suspension and the studying turned into recorded by means of the meter (Rhoades, 1982).

One gram of dry soil sample was taken to a 500 ml in conical flask. Ten drops of 1 N potassium dichromate and 20 ml of H_2SO_4 concentration were added. Mixed suspension was allowed to stand for 30 minutes. After cooling 200 ml DI, water was added and 10 ml of orthophosphoric acid was added to allow to cool. After that 10-15 drops of diphenylamine are added as an indicator and the flask is placed in a magnetic stirrer. After removing 0.5 M ferrous ammonium sulfate was added, so that the color changed from blue to green (Walkley, 1947).

$$\%\ \text{Total Carbon Organic} = \frac{\text{Vol. of empty FeSo4} - \text{Vol. of the FeSo4 sample}}{\text{Weight of a Ground Sample taken}} \times 0.3 \times N$$

Ten gram of soil sample was taken and placed into a dried beaker. Thirty mL Sodium hexametaphosphate ($NaPO_3$)13 was added and shake for several hours in a reciprocal shaker. The suspensions in the beaker are washed in quantitatively, with a 53- µm sieve with plenty of DI water, in a dry oven beaker , until the water is clear (the separation of the beaker suspension is called Mineral-Associated Organic Carbon (MOC), with particle size <53 µm).

Ten grams of soil sample was taken and placed in a dry beaker. Thirty mL Sodium hexametaphosphate ($NaPO_3$) thirteen became added to shake for hour on reciprocal shaker. Retained material stored in a sieve to every other pre weighed dried (now the suspension separation in the beaker is known as organic carbon, %, with particle length> 53 µm).

Percentage of Soil organic were determined by the means of the technique described by (Nelson and Sommers, 1982). For this reason, 1.o g of soil became measured in 500 ml of beaker and 10 ml of 1N potassium dichromate answer was brought, then 20 ml of concentrated sulfuric acid become brought through a dispenser and mixed well. The combination turned into then allowed to face for 30 minutes, then diluted with two hundred ml of distilled water, 10 ml of orthophosphoric acid was delivered through a dispenser and the mixture became allowed to cool. Now after including 10 -15 drops of the diphenylamine indicator it changed into titrated with 0.5 N $FeSO_4.7H_2O$ till the colour modifications from violet blue to the green quit. Natural depend in soil content material became calculated by way of components as follows:

$$\%\ \text{Organic Carbon} = \frac{\text{Volume. Of empty FeSo4} - \text{Vol. of FeSo4 sample}}{\text{Weight of a Sample taken}} \times 0.3 \times N$$

TOC = 1.334 × Percentage Oxidized organic carbon; N is

normality of $FeSO_4$

Organic Matter was determined by multiplying the Total Organic Carbon by a factor of 1.724.

Microbial biomass carbon turned into measured in the shape of fumigation extract method. Ten-gram fresh soil pattern turned into interested by a 50 ml beaker and 10 g of one of one hundred twenty five ml bottle. After that 30 ml of chloroform-unfastened alcohol turned into transferred to another 50 ml beaker and located in desiccators to be to be had at 25 °C for twenty-four h. After fumigation, the pattern became extracted with 50 ml zero.five M K_2SO_4 and stirred for 30 min and filtered. Every other 10 g of soil become extracted equally but without fumigation. Thereafter 4 ml of the extracted pattern was despatched to the digestive tube and 1 ml of 0.0667 M potassium dichromate become delivered. Regularly five ml of H_2SO_4 attention was delivered and heated to a hundred and 50 °C for half-hour. The contents had been transferred to a 100 ml round flask and supplied with a three-four drop of indicator O-phenanthroline monohydrate. Subsequent recording turned into done with ferrous ammonium sulfate answer (Brookes et al., 1984).

The height of the plant life was recorded in mature plants with the help of a meter rod. The measurement was crafted from soil stage to the pinnacle of the plant in inches. Monopodia branches, additionally known as vegetative branches, appear on the main trunk at the bottom of the plant in the early developing season; calculated as monopodia quantity in step with plant. The sympodial branches, also referred to as fruit branches, from the primary stem and monopodia, are calculated because the wide variety of sympodia for every plant.

The data were recorded through calculating the entire variety of mature and open bolls and divided by means of the total wide variety of sympodia. Total quantity of mature and open bolls from all the picking become counted and recorded for every flora one by one. Boll weight was taken in grams by means of dividing the full weight of seed cotton decided on for each plant with the aid of the quantity of lively bolls in every plant. A complete of two picks at normal intervals have been taken from each supervised plot and become weighed in weight in step with kilogram as seed cotton seed per plant.

Statistical Analysis

Data were collected on a variety of factors obtained from the Analysis of variance (ANOVA) and the methods obtained were compared to a 5% value by examining the (LSD) Last Significance Difference (Steel et al., 1997).

RESULTS AND DISCUSSION

Soil pH

The effect of organic amendments on soil pH at the time of sowing and harvesting were given in the (Figure 1). The highest value of soil pH 8.13 was observed under control plot that was 8.1 in FYM followed by PM, while 7.8 in Green manure respectively at the time of sowing. While there were minute changes observed under different treatment at crop harvesting time the values were recorded 8.13 in control plot, 7.90 in Farm yard manure and 7.78 were obtained in the poultry manure and pH 7.63 recorded under Green manure. Statistically no significance differences were obtained in both at the time of sowing and harvesting.

Additions of organic matter decrease soil pH because decomposition of organic material releases organic acid that reduced soil pH. Ali et al. (2015) also reported that soil pH reduced under organic amendments due to incorporation of organic materials.

Organic matter were decreased pH due to soil none disturbance which improve the activity of micro-organism & decomposition taking place, which ultimately released carbonic acids in to the soil, so result shows that soil pH decreased. Same results were attained from Neina (2019) that addition of organic residue and decrease in pH with manure due to production of organic acid & Plant root-encouraged pH of soil change in the root zone controlled by specific processes like, ion uptake that released inorganic ions that maintain electro neutrality, organic acid an-ions excretion, respiration, and root exudation process and as well as processes of redox-coupled. McCauley et al. (2009) explains that lower pH was found to be at farm yard manure condition due to excess amount of organic matter and higher leaching of bases as compared to poultry manure. This may be explained that release of organic acids and higher addition of organic matter leads to decomposed pH of the soil which finally reduces them. Effect organic matter were highest & pH was noted in green manure with regard to lowest tillage system (Rousk et al., 2009).

EC Concentration (dSm^{-1})

Soil EC under all organic amendments were given below in (Figure 2). EC content were significantly higher under control plot at the time of sowing followed by FYM, PM and GM. The value were recorded (1.30 dS/m) in control plot, (1.25 dS/m) in FYM followed by poultry manure (1.8 dS/m) and (1.11 dS/m) in Green manure at the time of sowing .The higher value soil EC was recorded in control plot (1.77 dS/m) followed by FYM (1.76 dS/m), poultry manure (1.74 dS/m) and respectively Green manure (1.25

dS/m). Statistically no significance differences were obtained in both at the time of sowing and harvesting.

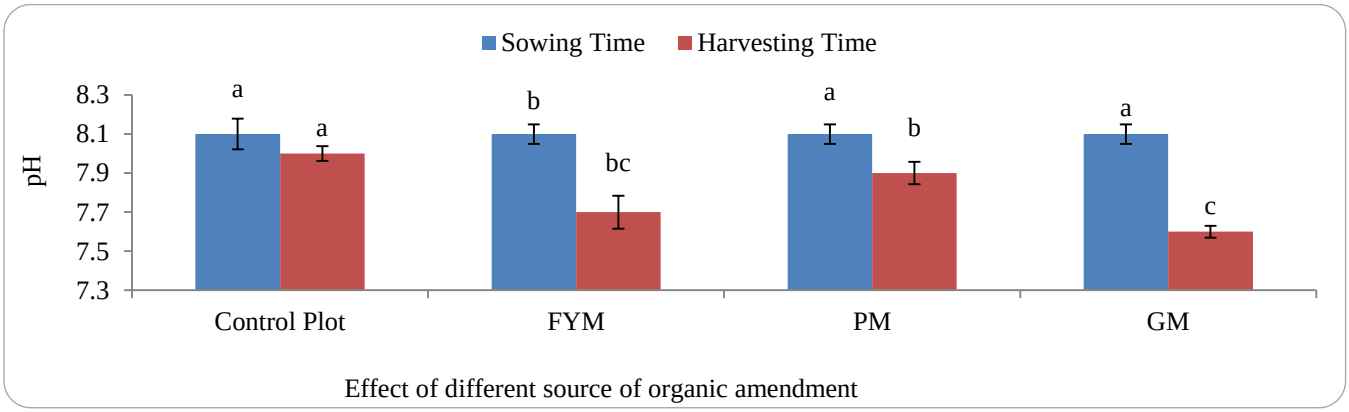

Figure 1: Soil pH concentration under different organic amendments practices during 2020 under cotton crop in Sibi Balochistan.

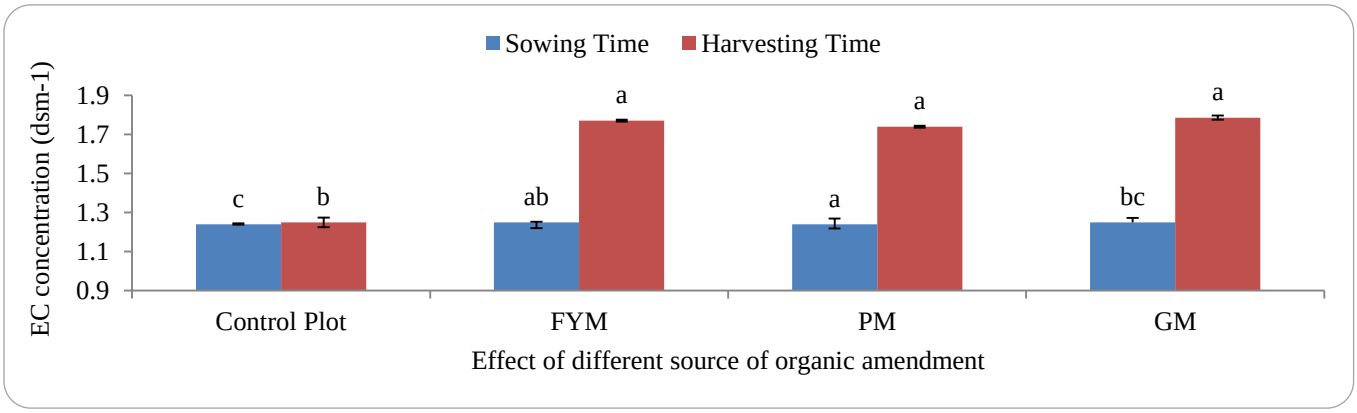

Figure 2: Soil EC concentration (dsm^{-1}) under different organic amendments during 2020 cotton crop in Sibi of Balochistan.

EC is affecting by natural process like climate, soil texture, and minerals of soil, relative humidity, rainfall, and hailstorm. Salts originate from weathering of rocks like minerals & high amounts of rainfall, soluble salts from minerals and rocks are flushed below the rhizosphere, under deep groundwater systems. On the other hand, in arid areas where reduced rainfall or saline irrigation water is dissolved, soluble salt may build up and remain around the surface of the soil leading to higher EC in arid or low-water areas where annual rainfall is low. Additionally Kahlon and Gurpreet (2014) also recorded that the mean maximum value of EC under organic amendments in soil and low EC in 1.74 dS/m in poultry manure two different soil types (Sandy loam and Loamy Sand). EC were recorded maximum green manure because of previous residual organic matter were presented in soil as compared to other amendments.

Total Soil Organic Carbon (%)

The effect of organic amendments on soil TOC at the time of sowing and harvesting were given in the (Figure 3) The TOC value were obtained and recorded (0.62%) in control plot at the time of sowing, (0.65 %) in FYM, (0.64 %) in poultry manure ,while the lowest TOC recorded, (0.62 %) in Green manure at the time of sowing. However after harvesting TOC were obtained and recorded much highest (0.95 %) in control plot followed by, (0.88 %) in FYM, (0.86 %) in PM and TOC recorded in Green manure respectively, (0.74%). Statistically no significance differences were obtained in mean values at the time of sowing and harvesting.

In these regions, with high Evapo-transpiration rates leads to a low crop biomass production and, thus, low and erratic rainfall together to a limited residue input into the soil. The increased TOC in the application of Green manure is possibly because previous residue were present in the soil and restricted of soil carbon oxidation. Severe tillage practices step up soil organic matter (SOM) mineralization

(Nath and Rattan, 2017). By the results of Kiluk (2014) increased addition of C–input is due to increased total organic carbon in the residue retention treatment. This way, conservation of organic amendments based on crop establishment in combination with residue preservation may lead to a strong positive impact on health of soil, soil organic carbon (SOC) on a particular level. Drought regions are considered to have a low SOC content that retains water and nutrient retention and, therefore, is low in soil fertility (Lal, 2004). Accumulation for different organic matter usually effects the concentration of SOC. The results were obtained from 0-15cm of soil depth surface analysis, as a result treatment showed a significant change (Martínez et al., 2008).

Mineral Associated Organic Carbon (%)

The Mineral associated organic carbon in soil were recorded at the time of sowing and harvesting were given in the (Figure 4). Mineral associated organic carbon were recorded at the time of sowing (0.46%) in control plot followed by (0.45%) in FYM, (0.41%) in PM, while value (0.32%) recorded in GM. The values obtained and recorded at the time of harvesting (0.67%) in control plot, (0.67%) in FYM, (0.62%) were obtained in poultry manure .The lowest value recorded in (0.46%) respectively in GM after harvesting.

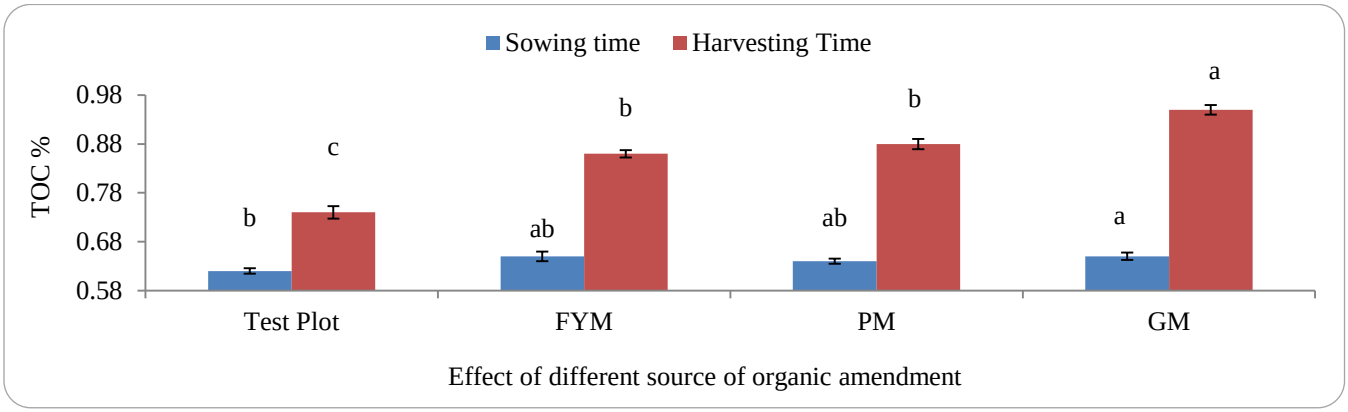

Figure 3: Soil TOC concentration (%) under different organic amendments practices during 2020 under cotton crop in sibi Balochistan.

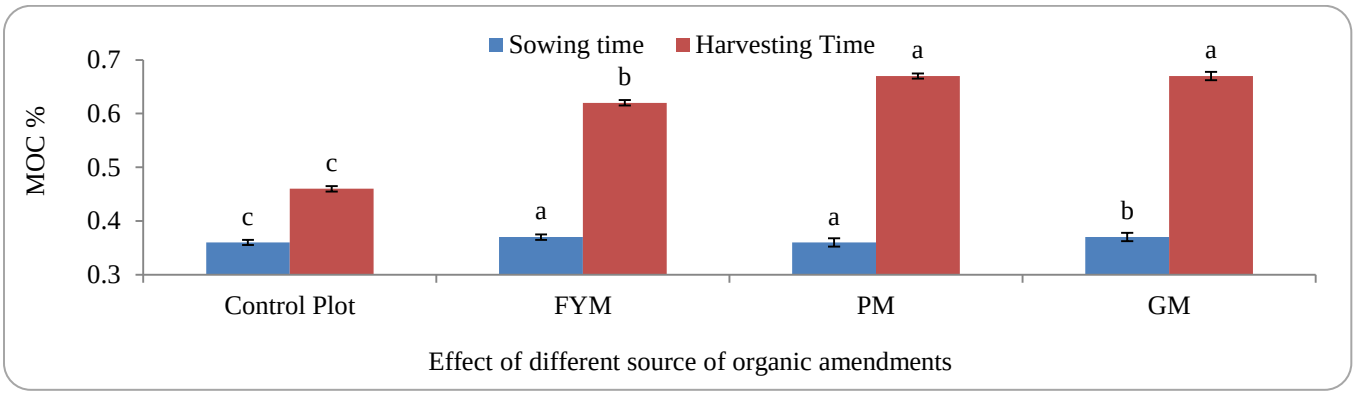

Figure 4: Soil MOC concentration (%) under different organic amendments practices during 2020 under cotton crop in Sibi Balochistan.

Statistically no significance differences were obtained in mean values at the time of sowing and harvesting. The logical reasoning mineral related organic carbon beneath exceptional amendments without prevention of natural matters is associated with the better decomposition of natural carbon. the best quantity of carbon in mineral associated natural carbon fractions than in in charge fractions is probably due to specific climatic elements i.e. high temperature relative humidity, unfavorable fluctuation to organic count number decomposition and transformation to MOC. Our outcomes have been depicts to as Ji et al. (2012) and Benbi et al. (2014) that data has significant impact of natural amendments on MOC was possibly due to short length of take a look at and as properly physical and

chemical attributes of soil natural count number and biological decomposition.

Particulate Organic Carbon

The effect of organic amendments on soil particulate organic carbon at the time of sowing and harvesting were given in the (Figure 5). During the entire research work numerical changes were observed. The minute changes were observed and recorded at the time of sowing (0.34%) in control plot followed by soil POC (0.37%) in FYM, (0.37%) in PM and (0.36%) in GM at the time of sowing .Maximum mean value of soil POC (0.56%) was record in Poultry manure followed by Farm yard manure (0.55%) and in Green manure (0.52 %), (0.33 %) in control plot respectively after harvesting. The result elaborated that sowing and harvesting time have no significant effect on different organic amendments on soil POC.

Due to high susceptibility to natural amendments more suitable natural carbon, percent became also an essential indicator that reflects the preliminary reaction of SOC fame beneath unique soil mechanism processes (Chan, 2001). Particulate organic carbon turned into the SOM soil natural remember fraction with a soil length particle tiers diameter extra than 53 µm; residues attained from plant life and organisms a shorter soil residence time slower income charge. The labile C represents a form percent this is prone to mineralization within the short time period, very sensitive to versions in plant residue inputs and their publicity to degradation with regards to the soil management, and moreover first fraction to mirror modifications within the labile C content within the soil (Wander, 2004). The particles of the mineral related natural carbon fraction of soil herbal count number variety have a diameter a great deal less than fifty 3 µm, and interact with the surface of mineral particles to shape natural-mineral complexes. This department corresponds to SOM in a complicated level of stabilization and with longer residenced time inside the soil (Lammerding et al., 2011).

Accordingly, the size fractionation of soil natural rely (SOM) particles can help to assess the adjustments because of the land use, due to the sensitivity of these fractions to the outcomes of soil management (Haynes, 2005).

Organic Matter Content (OM) (%)

Organic matter results under different organic treatments were recorded and display in the (Figure 6). The data revealed that there were no significant effect on organic amendments at the time of sowing and harvesting. However minute changes were observed.

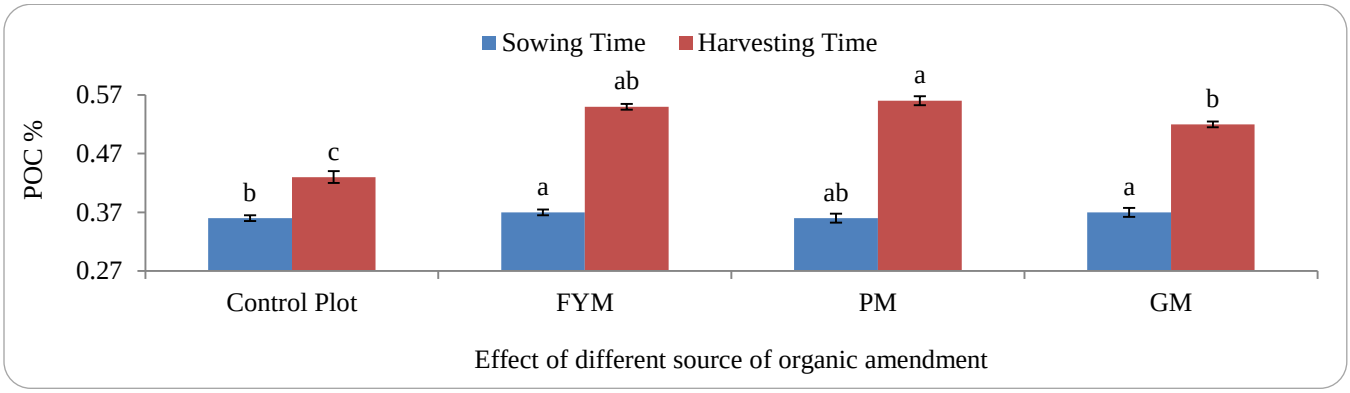

Figure 5: Soil POC concentration (%) under different organic amendments during 2020 under cotton crop in Sibi Balochistan.

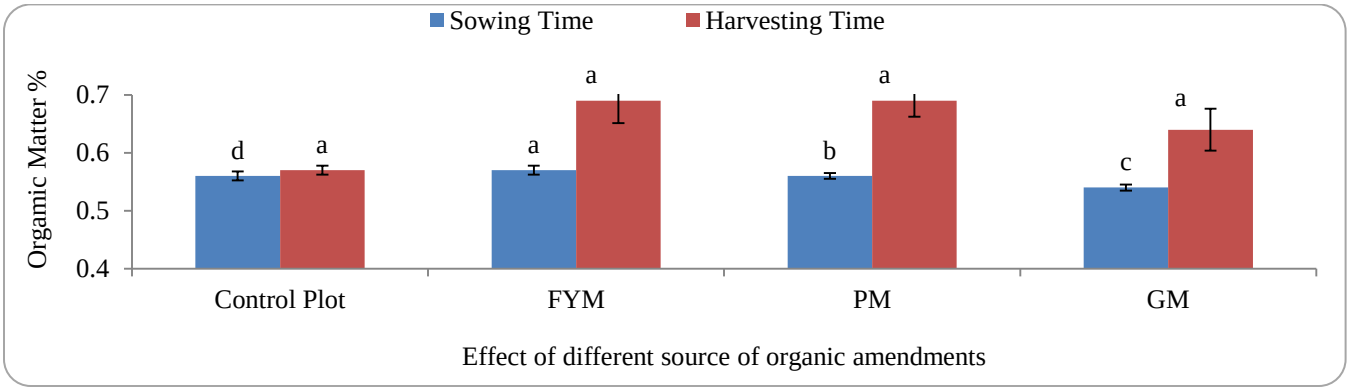

Figure 6: Soil OM concentration (%) under organic amendments during 2020 under cotton crop in Sibi, Balochistan.

Results suggested that maximum mean value of soil OM (0.57%) were observed in Farm yard manure at sowing time followed by (OM 0.51%) in poultry manure, (OM 0.48%) were recorded in Green manure and much lower value (OM 0.42% in test plot respectively. At the time of harvesting the value were observed and recorded in FYM followed by (0.68%) in poultry manure, (0.64%) in Green manure (0.57%) in control plot after harvesting respectively.

Organic matter differs in stage of decomposition and degree of association with mineral material. These organic matter (SOM) collectively represented a reservoir of nutrients that are essential for plant growth and development. Organic amendment impact on soil organic matter numerous due to soil type, cropping system, cultural practices, residue management and different climatic conditions. (Kay and VandenBygaart, 2002; Marschner et al., 2008).Thus, soil pH increases the content of dissolved organic matter in different amendments condition found to have minimum pH due to maximum amount of organic matter and higher leaching of bases. This may be accredited to higher addition of organic matter whose decomposition hints to release different types of organic acids which reduced the pH of soil. Soil organic carbon dynamics can amazingly affect fertility of soil &production of crop in the ecosystem of agricultural sciences. The most vital properties for arable land are soil organic carbon that further explained as fundamental indicator soil function and as well as soil quality (Bessam and Mrabet, 2003; Kibet et al., 2016). With different actions of soil organic carbon affects them on different parameters like soil physical, thermal, chemical and biological properties. Soil quality always gets better by an improvement of SOC content through applications of organic amendments that improves soil combination and have equilibrium effects on the soil structure. In addition, soil fertility has vital effects on SOC, proper availability of plant nutrient and cat-ion exchange capacity of soil. The review suggested that there is clear association between soil organic carbon contents on the soil surface (Neina, 2019).

Microbial Biomass Carbon

Soil microbial biomass carbon (MBC) were preferably affected by different organic amendments and shown in the (Figure 7). The results observed that there were no significant effects on different organic amendments practices on soil (MBC) at different time of sowing and harvesting. Minute changes were observed during the entire research work. Maximum mean value of soil microbial biomass carbon MBC (1.5%) were observed and recorded in FYM followed by (2.2%) in GM, (2.2%) in poultry manure and (2.3%) respectively in control plot at the time of sowing. The Mean value of soil microbial biomass carbon MBC (2.5%) were recorded in FYM, (2.5%) in Green manure followed (5.5%) in farm yard manure and (2.5 %) in control plot respectively after harvesting.

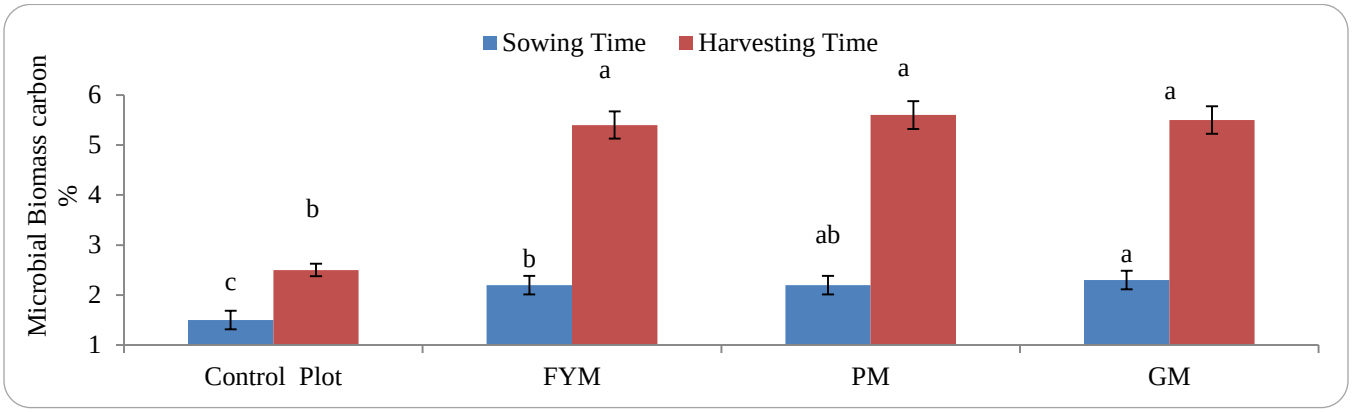

Figure 7: Soil Microbial Biomass Carbon concentration (%) under organic amendments practices during 2020 under cotton crop in Sibi, Balochistan.

Soil microbial biomass carbon MBC reply hastily to modifications in soil management practices (Biederbeck et al., 2005; Vian et al., 2009) and had been proposed as more sensitive indicator of the adjustments in soil great as stricken by exceptional soil management practices (Nannipieri et al., 2003; Roscoe et al., 2000). the obvious boom in MBC density beneath chicken manure and inexperienced manure and farm backyard compost structures can be attributed to the moderate degradation of natural rely and the accumulation of organic matter including crop residues which has brought about the addition of an lively SOC reservoir. The MBC were non-

appreciably correlate (r = 0.74) with TOC (Appendix 27) as natural count number serves as a source of energy for soil micro-organisms, its availability managed to growth of greater microbial biomass in surface soil (Sapkota et al., 2012). Soil microbial biomass and their hobby could have a big effect on crop residues, which in flip, affect the potential of soil to supply nutrients to plant life via soil natural count turnover. Organic carbon content in soil has an undoubtedly co-relation with microbial biomass carbon (Ekenler and Tabatabai, 2003). The larger effect length of SOC on MBC shows that SOC the greater determinant of MBC, rather than clay content. Water-soluble contents natural carbon became released into the soil answer in proportion to the quantity of SOC gift. This impartial water-soluble natural carbon is released from an outer layer of SOC, in association with clay particles. Water-soluble natural carbon within the soil solution is then fed on with the aid of microbes in-so-far-as nitrogen is available to combine with the carbon to construct microbial biomass (Liddle et al., 2020). The inter courting between SOC and MBC demonstrates the imperative function of SOC for function of soil, in phrases of nutrient accessibility and development on structure of soil through the contribution of microbes (Alvarez and Alvarez, 2016).

The high microbial biomass carbon MBC under various systems of cultivation and storage of crop residues was related to improve total organic matter in soil. The main source for microbial community is crop residue. Soil microbial biomass carbon has recommended as sensitive indicator to the health of soil improvement as affected by different systems of tillage and crop residues (Nannipieri et al., 2003). Some other researcher explained that increasing concentration of carbon input and their low mineralization process were quit beneficial for increasing microbial biomass carbon MBC under organic amendments systems. Also explain that natural soil activities improve through the maintenance of farming practices (Šimon et al., 2009).

Crop Data

Plant Height

Plant height play pivotal role in crop production, plant height observed and recorded shown in the (Figure 8) the mean value of plant height in the test plot 60.2 cm, in farm yard manure 67.1 and 70.9 in poultry manure, 66.3cm respectively in the green manure. Numerical changes were observed during research work.

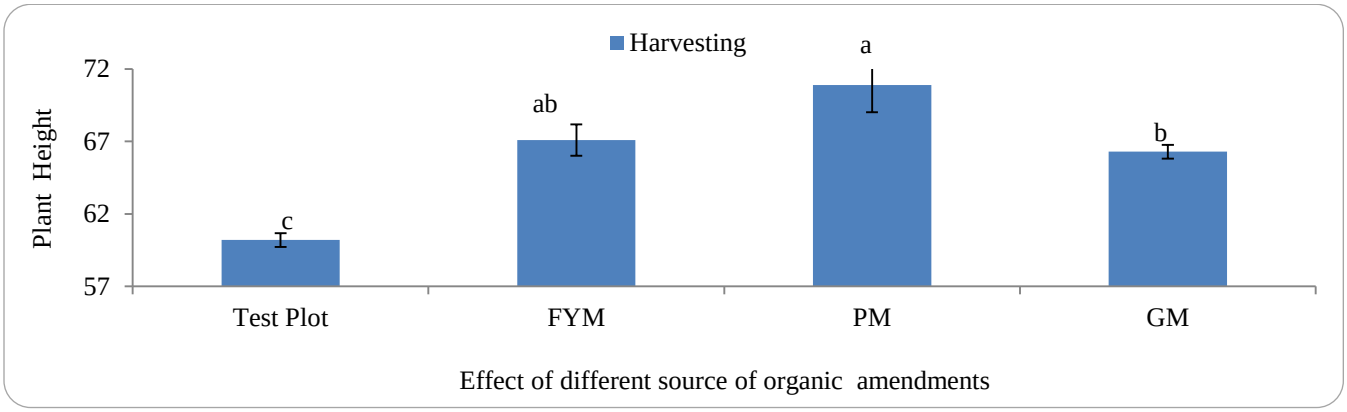

Figure 8: Plant Height cm under different organic amendments during 2020 cotton crop in Sibi, Balochistan.

The peak of the flora plays an important role in increasing the yield of seed cotton as it's far without delay proportional to the sympody in step with plant, bolls in keeping with sympodia, and bolls according to plant, if there may be no safe haven. Previous studies found out that tremendous variations have been located among the peak of the cotton crop and different behavioral and fruit factors in northern cotton (Raza et al., 2016). Some research have proven that plant peak has a effective affinity for cotton seed, seeds in cotton, seed genotypes (Ahmed et al., 2024). Khan et al. (2007) investigated whether or not plant lengths were undoubtedly associated with sympodia, as well as cotton seeds within the excessive cotton population. But, in some research the bad affinity for crop yields and cotton seeds has been produced and reported in better cotton genotypes (Elsiddig et al., 2007) that may be due to organic amendments.

Monopodia per plant

Monopodia per plant observed and recorded shown in the (Figure 9) Monopodia per plant varied in organic amendments, Mean value in test plot observed and recorded 1.8 per plant, in farm yard manure 2.3 and in both poultry

manure, green manure 2.4 respectively. Maximum monopodia per plant observed in poultry manure and green manure. Other monopodia per plant population showed medium number of vegetative branches. There was no significance difference among the monopodia per plants.

Vegetable elements can also play a high quality position in dealing with the cotton crop yields because of the large variations among the genotypes of cotton and whilst a great blend with the cotton seed seeds in northern cotton (Ahmad et al., 2008). The higher genetic version and significant decrease in monopodia had been found at crossroads in rooster manure compared to their parent crops in northern cotton (Iqbal et al., 2013).

Sympodia's Per Plants

Sympodia's Sympodia's on fruiting branches per plant among the organic amendments were recorded and shown in the (Figure 10) The mean value of sympodia per plant recorded in test plot 7.9 per plot, followed by 8.9 farm yard manure , 10.5 in poultry manure and in green manure 9.2 per plant .In the organic amendments poultry manure application gives us more symbodia. There were no significance differences among the bolls per sympodia.

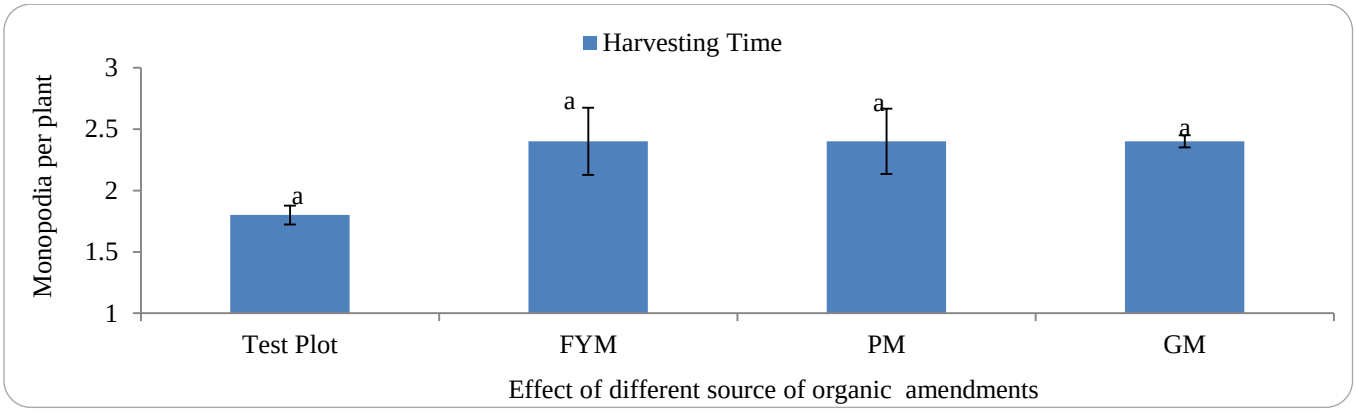

Figure 9: Monopodia per Plant under different organic amendments during 2020 cotton crop in Sibi, Balochistan.

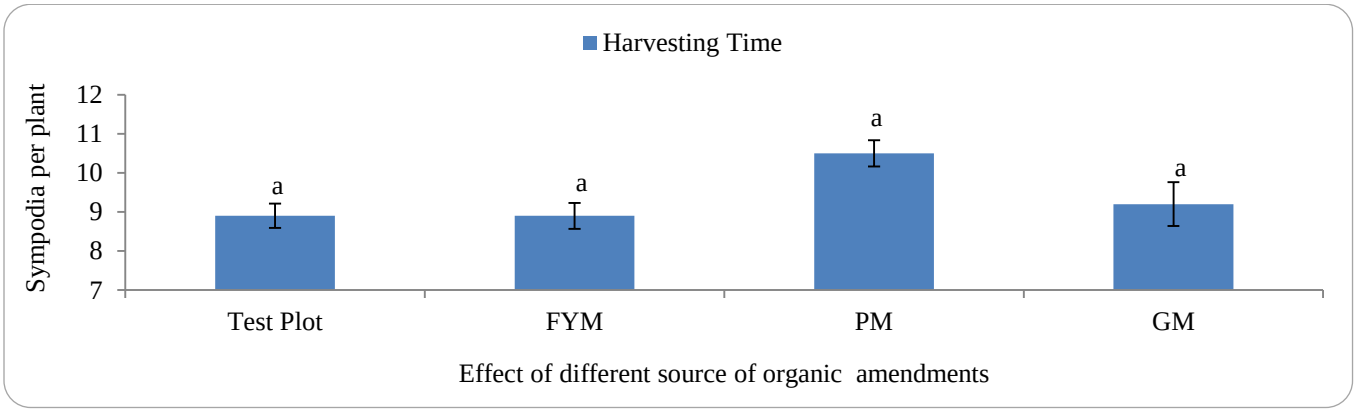

Figure 10: Sympodia per Plant under different organic amendments during 2020 cotton crop in Sibi, Balochistan.

In cotton sympodias for each plant is one of the maximum essential parameters that interacts directly with cotton seeds. large tiers of variability have been discovered a few of the various organic amendments of cotton inside the branches of every plant (Batool et al., 2010; Çopur, 2006). In tremendous cotton, a sympodias for each plant produced an awesome mixture with cotton seeds indicates that the cotton crop yields were strongly inspired by way of the branches of the agencies. A few previous findings have additionally shown sympodias for every plant with a good aggregate of seed cotton seeds and different contributing factors (Bibi et al., 2011).

Bolls per Sympodia

Bolls per sympodia in the organic amendments was recorded and shown in (Figure 11) the mean value of bolls per plant was in test plot 1.1 per sympodia, followed by farm yard manure 1.5 and in poultry manure 1.3, green manure respectively 2.0 bolls per sympodia. Maximum

bolls per sympodia were observed in green manure. The means were not significance difference in the bolls per sympodia.

The bolls in step with sympodia are an important a part of the crop that controls the yield of seed cotton directly with the growth in the range of bolls. Therefore, the observe factor has a very high-quality effect at the production of cotton seeds. Latest research has proven that natural cotton plant extracts have exceptional values consistent with plant of sympodia, as well as the most excellent first-rate-tuning function of the cotton seed, and really specific from the cotton people also cited by way of (Khan et al., 2009).

Bolls per Plants

The Bolls on the plant was observed and shown in (Figure 12).The mean value of bolls per plant in test plot 17.5, in farm yard manure 19.3, poultry manure 19.1 and in the green manure recorded 18.3 bolls per plot. Bolls consistent with plant have a primary impact on donations that have an instantaneous impact on cotton seed production. Breeders take special interest in increasing the wide variety of bolls in keeping with plant as it's far one of the maximum critical elements affecting the cotton crop yield. Widespread differences were observed in the early type of upland cotton populations (Khan et al., 2009).

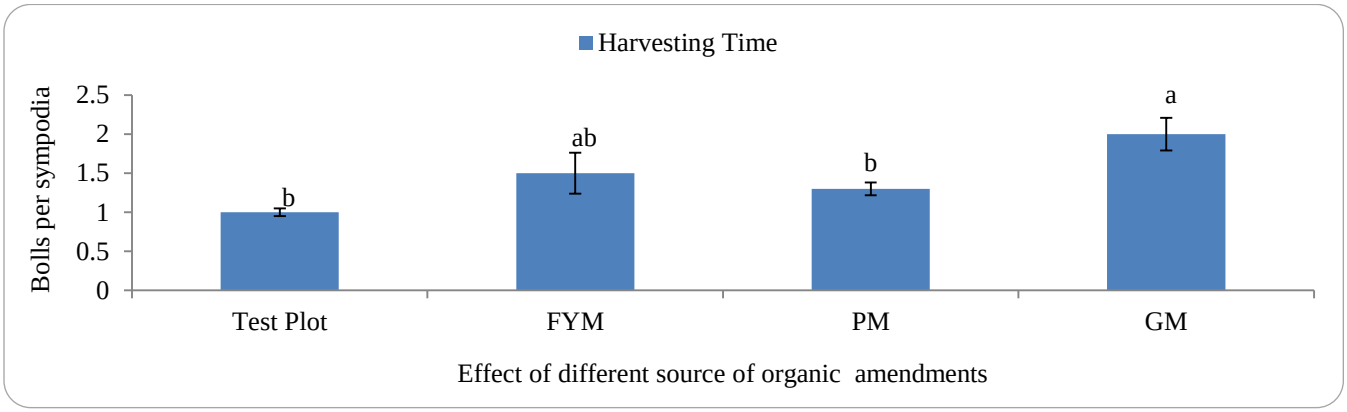

Figure 11: Bolls per Sympodia under different organic amendments during 2020 cotton crop in Sibi, Balochistan.

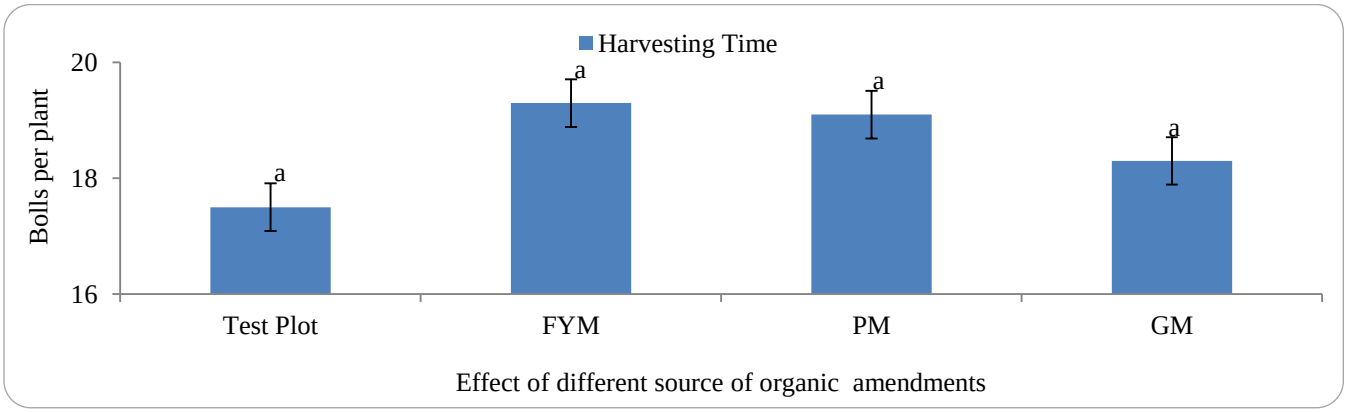

Figure 12: Bolls per plant under different organic amendments during 2020 cotton crop in Sibi, Balochistan.

Boll Weight (g)

Bolls weight were observed and recorded which was shown in the (Figure 13).The mean value of Bolls weight were recorded in the test plot 2.0 g in farm yard manure 3.2 g, poultry manure 3.3 g and in green manure respectively 3.0 g bolls weight . However, minimum boll weight (2.0 g) was observed in test plot and was found maximum in farm yard manure 3.1.Other two poultry manure and green manure application were having medium boll weight (3.1) and (3 g).

Boll weight changed into the second one most crucial yield yield after the variety of bolls, and that why unique interest ought to be paid to the load of the bolls all through the selection of genotypes in increasing the yield of seed cotton. Considerable differences and massive genetic editions have been pronounced among the northern fee of cotton bolls and

different production materials (Batool et al., 2010; Soomro et al., 2008).

Cotton Yield

In In present studies, seed cotton yield was positively reposed to organic amendments the cotton yield was observed and recorded shown in the (Figure 14). Cotton yield in test plot 2.3 mon in control plot, and positively responded to organic amendment recorded in the farm yard manure application 3.3 Mon, in poultry manure 3.6 mon, green manure 4.3 mon. The cotton yield become adjusted by means of plant duration, sympodia in keeping with plant, bolls per sympodia, bolls in step with plant, boll weight, locules in keeping with bolls, and seeds in keeping with locule and seeds in line with boll.

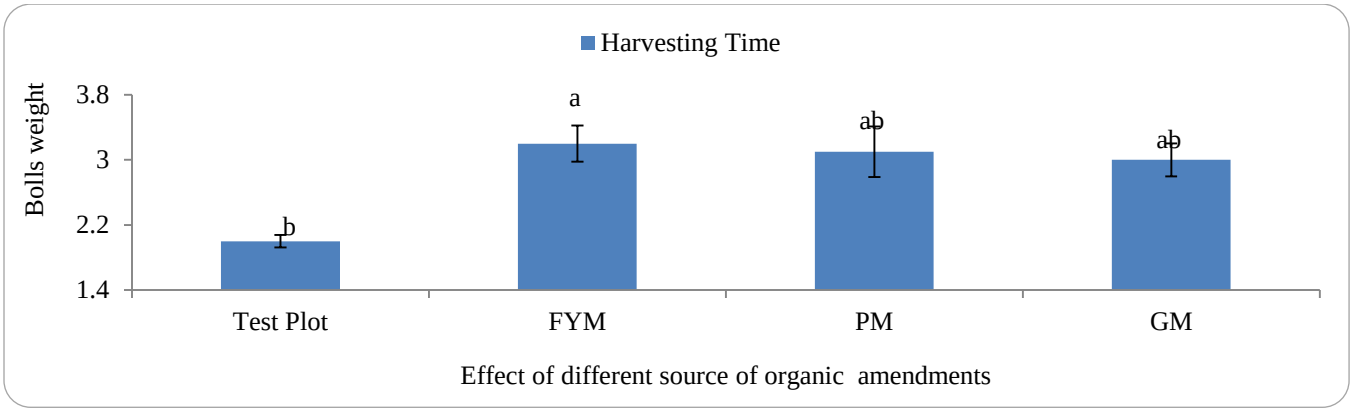

Figure 13: Boll Weight g under different organic amendments during 2020 cotton crop in Sibi, Balochistan.

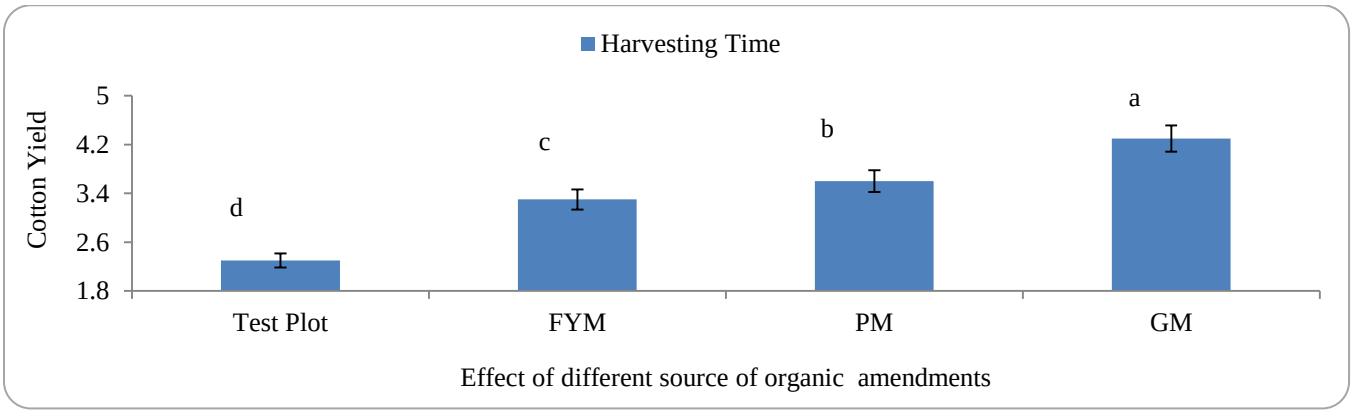

Figure 14: Cotton yield for various organic amendments in cotton crop in Sibi, Balochistan.

Harvesting time yield became a complicated function that depends on the components of the crop, soil management, fertilizer amendments and consequently, organic amendments and yields are very critical and play a prime role in managing the cotton crop yield (Magadum et al., 2012). Seed cotton production changed into the final made of the cotton plant, which relied heavily on bolls in line with plant and boll weight. Previous studies have proven giant differences among parenting crops and their seed yield of cotton seed in cotton genotypes (Khan et al., 2018).

CONCLUSION

Organic amendments play a pivotal function in soil health, significantly growth in cotton crop yield with an increase in soil nutrient content at the bud level as well as in all around the crop consultation. Consequently, it is encouraged that organic amendments such as farm yard manure, poultry, and green manure have an effective impact on soil structure, the manufacturing of natural cotton and the soil environment. It has to be utilized in all vegetation for enhancing the soil shape, sustainable surroundings, and accomplishing sustainable crop production.

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CONFLICT OF INTEREST

The authors declare that there is no conflict in the publication of this article.

AUTHOR'S CONTRIBUTION

All the authors contributed equally in the manuscript.

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