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TOMATO RESEARCH ON THE EFFECTS OF DIFFERENT NUTRIENT MANAGEMENT AND MULCHING PRACTICES

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ABSTRACT

Recent years have seen a growth in the use of nutrient management and mulching techniques in tomato farming operations. Because of benefits such as a favourable soil temperature, reduced weed growth, moisture conservation, and greater crop output in India. Organic rice straw, soya bean straw mulch and inorganic HDPE plastic are mainly included in the mulch options and management of fertilizer also practices of nutrient management basically used by farmers to effectively manage nutrient inputs. Fertilizer management and mulch options included black inorganic HDPE plastic, organic rice straw and soybean straw mulch, as well as nutrient management practices used by farmers to manage nutrient inputs. Researchers found that plant height, number of flowers per cluster and SPAD values, as well as fruit weight and yield were at their greatest levels. Fertilizer management and mulch options included black inorganic HDPE plastic, organic rice straw and soybean straw mulch, as well as nutrient management practices used by farmers to manage nutrient inputs.

Keywords- *Plastic Black Mulch, Rice straw mulch, Soybean Straw mulch, different methods of nutrient management*

I. Introduction

(Lycopersicon esculentum Mill) is a tomato variety. With 789.2 thousand acres and 19759.3 thousand metric tonnes of production per hectare, it is the most abundant crop in India. When grown on an area of 84, 53,000 acres, it yields 2419, 8 thousand metric tonnes, with an average productivity rate of 28.62 ton/hectare for Statistics Division of Horticulture in M.P. While theer are various states producing Tomatina such as UP, Bihar, MP, West Bengal, Andhra Pradesh, Orissa and Karnataka. A and C vitamins, potassium, minerals, and fibers are abundant in tomatoes. Soup, salad, pickles, ketchup and sauces are all made with tomatoes. They can also

be eaten as a vegetable in a variety of other ways. After potato and onion, tomato is the third most popular food.

Researchers have observed that mulching greatly enhances the growing conditions for vegetables (Smolikowski et al., 2001). Mulch is any substance that is spread on top of the soil in order to preserve moisture, maintain a favorable soil temperature around plant roots, prevent erosion, and limit weed growth. As a result, plants grow and develop more efficiently Mulches can be made from both inorganic and organic components (Meyer et al., 1970).

One of the valuable ways to increase yield of crop and improve product quality is by mulching with drip irrigation. Mulching increases soil temperature, conserves moisture and reduces erosion while also increasing organic matter content. To preserve water, numerous procedures have been implemented to ensure that irrigation water is used efficiently (Taylor et al., 1995).

II. Literature Review

To produce fresh 2market tomatoes, polyethylene mulch is widely employed. Included in these positive outcomes are increased total yields, earlier production, and higher fruit and fruit quality. According to researchers, the improvements were due to increased soil warming, improved water efficiency, and more consistent usage of fertilizers. Because of the influence of mulch colour on soil temperature, management decisions have historically been based on mulch colour.

Tomato plant development is affected by upwardly reflected light in plastic mulch culture (Decoteau et al., 1986). Tomato seedlings' growth was altered by a small adjustment in the wavelength compositions of light reflected off painted HDPE surfaces. On the other side, light spectrum quality has been demonstrated to alter tomato nutrient uptake. Due to the micro-level response of tomato plants to changes in their light environment, mulch colours that selectively reflect specific wavelengths of light into the plant canopy may be able to increase tomatoes' yield.

III. Nutrient management

After applying the necessary amount of fertilisers, including polyfeed, MAP, and Urea, tomato produced 45.7 t ha-1 fruit, which is 22-27 percent greater than when the crop was fertilised with regular fertilisers applied in the soil.

The Fruit Research Station Intkhedi Bhopal, which is part of the Rajmata Krishi Vidyalaya in Gwalior, undertook a study during the winters of 2017-18 and 2018-19 with the following objectives.

1. Examine alternative nutrient management strategies' impact on the top quality and productivity of tomato.
2. Evaluation of various types of mulching strategies on tomato production and quality.
3. Productivity and quality of Tomato will be studied by combining different methods of fertiliser management with mulching.
4. Economic viability analysis of treatment options.

IV. Materials and methods

Tomato production studies on different nutrient management and mulching practises. During rabi season, researchers conducted the study in 2017-18 and 2018-19, respectively. Listed below is a brief explanation of the resources and strategies used in the examination:

IV. Weather Conditions of the experimental site

Latitude and longitude coordinates are 23.3 north and 77.3 east. Elevation is 487 metres above mean sea level. It has a subtropical climate, with pleasant dry winters, sweltering summers, and the humid monsoon season. During the duration of the research project, the average yearly rainfall was 116.3 cm, the average highest temperature was 40.8c, and the average lowest temperature was 10.8c. Meteorological data is summarised in this report.

V. Soil

In the trial field, the soil was a light sand loam with some clay. Before starting the experiment, random soil samples were taken at a depth of 15 cm using an auger. As a result, it's important to find out which mulches work best. Because mulches improve water infiltration, retention, and reduce runoff, they can be a valuable tool for crop growth. As a result of putting a cover on the soil surface, it helps decrease and regulate soil erosion.

Researchers in Venezuela studied the effects of N (0.90 kg/ha), P (205 kg/ha), K (20.90 kg/ha), and P (205 kg/ha) on tomato yields and quantity of fruits. It was shown that 180 kg N, 270 kg P2 05, and 180 kg K20/ha produced the maximum yield and fruit per plant. In particular, it was able to reduce the amount of phosphorus that was applied. Not because of larger fruits, but

because of a greater number of fruits. A large quantity of fruits were produced as a result of N. Temperatures were highest on bare plots and under red polyethylene mulches.

A reduction in pest and disease concerns has also been noted as a benefit of mulching [19]. Vegetable clone of tomato N and K were applied to the field in Madhya Pradesh, India, during rabi 1992-1993 and 993-1994, according to [20]. Increased plant height, fruit number, fruit weight and fresh yield were observed following N treatment. While total soluble solids (TSS) content did not rise with increasing N rate, yield and yield components did increase as well. TSS concentration and vegetative growth increased with K. The shortwave radiation is reflected off of white-on-black mulch and silver mulch, respectively. The use of black plastic mulch on tomato plants improved the quantity of fruits per plant by five above bare ground. Mulches of different colours have a variety of effects on the crops that are being cultivated. Strawberry (Fragaria sp.) yields have been observed to be higher.

VI. Result and discussion

In this study, the combined application of fertiliser and mulching methods resulted in a significant increase in yield per plant and per bed as compared to the single application of fertiliser and mulching methods. Plant yield (6.86 kg) was highest in F3, whereas yield per hectare (886.05.q/ha) was lhighest while owest in F1 (3.73 kg, 31.64 kg, and 480.63.q/ha). Per plant (6.97 kg) and per bed (52.02 kg), the M3F3 treatment combination had the maximum yield, whereas the control had the lowest yield (2.67 kg) and lowest q/ha (480.63 q/ha). As the plant grows, so does its yield, which is inversely proportionate to its size. Application of fertiliser as well as mulching strategies were considered in the current study. Not only resulted in optimal plant growth, but also favored numerous critical yield components as described before, resulting in higher output.

VII. Economics

As a result, tomato production is extremely dependent on manpower. Also known as a labor-intensive industry, tomato production is a labor-intensive business. The cost of labour alone accounts for more than 60% of the total cost of operations for tomato production technology. The remaining 40% of the cost is split between stalking, fertilisers, seeds, fungicides, and bags.Schwarzmulch had the highest net yield (2,944,043.33 Rupees per hectare) when using the entire range of fertiliser management (RD). They found that the net return from nutrient management for organic rice straw mulch (Rs 263,687.13/ha) and organic soybean straw mulch

(Rs 263,687.13/ha) was 100%. A total of 283.3 rupees per hectare (Rs. Nutrient management and mulching were not used by farmers to achieve the lowest net yield (Rs 84,917.17/ha).

VIII. Conclusion

As a result of diverse fertiliser management and mulching approaches and their interaction, there was a large variation in plant heights. M3F3 had a higher maximum plant height of 69.9 cm than F3 (60.87 cm) (53.8 cm). The number of branches expanded dramatically as a result of diverse nutrient management and mulching approaches, as well as their interaction. M3F3 (14.9) has the highest number of branches, followed by F3 (13.9). The different methods of nutrient management and mulching practises, as well as their interaction, significantly increased soil temperature at 5 cm depth. Treatment Combination M3F3 recorded the highest temperature (36.08°) as compared to F3 (34.7°). M3 (33.37°) and M4 (33.37°). Soil Temperature taken at 10 cm depth was considerably increased with the different methods of nutrient management and mulching practices and also in their interaction Treatment Combination M3F3 recorded peak temperature(37.08º) as compared to F3 (34.6º). and M3 (32.55º). Spad value was significantly increased with the and also in their interaction Treatment Combination M3F3 recorded highest Spad value (73) as compared to F3 (68.73). and M3 (60.21) Nutrient management and mulching strategies, together with their interrelationship, all contribute to reducing the number of days till first blooming. M3F3 took the shortest time to flower (25.7 days), followed by F3 (26.37 days) and M3 (27.47 days) (28.93 days)

IX. Recommendations

M3F3 has the highest flower clusters per plant (33.16), followed by F3 (29.04) and M3F3 (28.53). Different types of nutrient management and mulching practises, as well as their interactions, had a significant impact on the number of flowers per cluster. In comparison to F3(6.07) and M3F3, M3F3 had the highest number of flowers per cluster. As a result of the diverse ways of nutrient management, mulching practises, and their interplay, the fruit set percent was also markedly increased. Treatment 73.51 percent of fruit set was observed by M3F3, followed by F3 (71.4 percent) and M3 (66.09). The no. of fruits per plant and per bed was augmented with different methods of nutrient management and mulching practices and their interaction. The most no. of fruit per plant (71.5) and per bed (753.83) was logged in M3F3 followed by F3 (63, 707.42) and M3(55.23, 633.43) The Average fruit weight was notably increased by different methods of nutrient management and mulching practices and their interaction. Treatment M3F3 recorded maximum average weight (588.67 g) as compared

to F3(543.54 g) and M3 (466 g). Yield of Tomato was appreciably increased due to different methods of nutrient management and mulching practices and their interaction. most yield per plant (6.97 kg) yield per bed (52.02 kg) and yield per hectare (959.42 q) was logged in treatment M3F3 as compared to F3 (6.86 kg, 45.89 kg, 886.05 q) and M3(5.81 kg, 41.42 kg, 793.51 q) respectively. As compared to F3(11.54) and M3(11.05), M3F3(8.998) had the lowest number of broken fruits per bed, followed by F3 (9.612) and M3 (11.19). No. of Blossom End Rot affected fruit per bed for treatment M3F3 was 9.042, followed by F3 (8.527) and M3 (9.042). (10.05). In terms of economic analysis, M3F3 had the highest net return of Rs. 294043.33 and the highest benefit-cost ratio. Tomatoes can benefit from organic manures and organic mulching such as rice straw, soybean straw, and black colour plastic mulching, as well as other methods of nutrient management.

X. References

Allison, J.E. (1973). Use of Mulches In, Soil Organic Matter and Its Role in Crop Production, 500–518. doi:10.1016/s0166-2481(08)70583-x

Aniekwe N, Okereke OU, Aniekwe MAN. Modulating effect of black plastic mulch on the environment, growth and yield of cassava in a derived savannah belt of Nigeria. Tropicultura. 2004; 22:185-190.

Ashrafuzzaman, M., M. Abdul hamid, M.R. Ismail, S.M. Sahidullah. Effect of Plastic Mulch on Growth and Yield of Chilli (Capsicum annuum L.). Brazilian Arshivesof Biology and Technology. 2011, 54(2): 321-330.

Ashworth S, Harrison H (1983). Evolution of mulches for use in the home garden. Hort. Sci. 18 (2): 180-182.

Asiegbu, J.E. (1991). Response of tomato and eggplant to mulching and nitrogen fertilization under tropical conditions. Scientia Horticulturae. 46:33-41.Bastar. Vegetable- Science. 27(1): 94-95; 4 ref.

Bhagat RM, Acharya CL (1988) Soil water dynamics during wheat growth under different management practices. Journal of Indian Society. Soil Science 36: 389-396.

Bharadwaj, R.L. (2013). Effect of mulching on crop production under rainfed condition- A review. Agricultural Reviews. 34: 188-197.

Brault, D., Stewart, K.A., & Jenni, S. 2002b. Optical properties of paper and polyethylene mulches used for weed control in lettuce. HortScience 37: 87–91.

Chadha, K.L. 2002. "Handbook of Horticulture", Indian Council of Agricultural Research, New Delhi, India, pp. 1-64

Chakarborty RC, Sadhu MK (1994). Effect of mulch type and colour on growth and yield of tomato. Indian J. Agric. Sci. 64(9): 608-612

Clough, G.H., Locascio, SJ. and Olson, S.M. (1990). Yield of successively cropped polyethylene mulched vegetables as affected by irrigation methods and fertilization management. Journal of American Society of Horticultural Science 115:884-887.

Contreras JI, Segura L, Pascual I, Catala JJ. Effect of the NPK fertilization and irrigation water quality on the quality of tomato fruit. Acta Horticulturae, 2000, 747

Dilipkumar, G., Sachin, S. S., & Rajesh, K. (1990). Importance of mulch in crop production. Indian Journal of Soil Conservation, 18, 20-26

Djigma, A. and Diemkouma, D., 1986. Plastic mulch in dry tropical zones. Trials on vegetable crops in Burkina Faso .Plasticulture 69, 1: 19-24.

Douglas, C. and Sanders, G., 2001. Using Plastic Mulches and Drip Irrigation for Vegetable Gardens Published by the North Carolina Cooperative Extension Service. Reviewed 1/01 HIL-8033

Erenstein, O. 2002.Crop residue mulching in tropical and semi-tropical countries: An evaluation of residue availability and other technological implications. Soil and Tillage Research67:115-133.

Felipe, E.F. and O.E. Casanova. 2000. Nitrogen, phosphorus and potassium fertilization in tomato (Lycopersicon esculentum Mill.) in the alluvial bank soils of the Guarico river. Revista Unillez de Ciencia y Technologia, 17: 21-44.

Gough, R.E. Color of plastic mulch affects lateral root development but not root system architecture in pepper. HortScience. 2001, 36: 66-68.

Greenough, D. R.; Black, L. L.; Bond, W. P. 1990: Aluminum-surfaced mulch: an approach to the control of tomato spotted wilt virus in solanaceous crops. Plant disease 74: 805- 808.

Gupta, C. R. and Sengar, S. S. (2000). Response of tomato (Lycopersicon esculentum Mill.) to nitrogen and potassium fertilization