



Original Article



***In-situ* moisture conservation through organic and poly mulching in different vegetables: popularization through Front line demonstrations**

S Sultana¹, S Sarkar*¹, S Hembram¹, S Saha¹, R D Mukherjee¹ and B Roy¹

¹Subject Matter Specialist, ²Senior Scientist and Head, Cooch Behar Krishi Vigyan Kendra, Uttar Banga Krishi Viswavidyalaya

*Corresponding Author: surajskrento@gmail.com

Received: 17/12/2023

Published: 07/01/2024

Background

Improving the water use efficiency without increasing cost of production is an ongoing goal in crop production system. Because natural resources (such as soil and water) are always under stress, increasing crop productivity calls for a methodical and scientific approach. We implemented conservation techniques like mulching to help achieve the goals of protecting the environment and minimizing the deterioration of soils, water, and other natural resources. Higher soil moisture was preserved by poly and straw mulch, which also protects the soil's surface from erosion and lessens wasteful evaporation from it. These benefits are especially useful when there is a shortage of water and ensures that plant water status is maintained. Straw mulch helps keep fruits clean from contacting the ground hence reduces chances of rotting, fruit cracking and blossom end rot disease. Cooch Behar Krishi Vigyan Kendra under the aegis of Uttar Banga Krishi Viswavidyalaya conducted front line demonstrations on use of poly mulch and organic mulching for in-situ moisture conservation in different vegetables and fruits.

Materials and methods

Front line demonstrations were conducted in multilocal farmer's fields at different villages under Cooch Behar district of state West Bengal during 2019-20. The aims of the FLDs were to assess the effect of organic mulching on irrigation in tomato and effect of poly-mulching on irrigation in banana.

Table 1: details of the frontline demonstrations

Name of the crop: Tomato	Name of the crop: Banana
Variety: Saaho (TO-3251)	Variety: Malbhog
Technology: Application of organic mulching with paddy straw @ 37.5 quintal Ha ⁻¹	Technology: Application of poly mulching with 30 micron size @ 22.5 rolls ha ⁻¹ (1 roll: 400 metre length x 1 metre width)

For both tomato and banana observations were taken on number of irrigation, cost of irrigation, yield and field water use efficiency (FWUE).

Field water use efficiency (FWUE) = Yield (Y)/water required (WR)

Results and discussion:

Table 2: Effect of organic mulching on irrigation in tomato

Technology	Irrigation			Yield (t/ha)	FWUE (kg/ha-cm.)
	No.	Water required (ha-cm.)	Cost (Rs./ha)		
Conventional cultivation of tomato var. saaho	13	51.53	11,115	26.02	504.95
cultivation of tomato with organic mulching in tomato var. saaho	9	39.77	7,695	26.15	657.53

Results (Table-2) indicated that that in mulching plots required 9 times irrigation as compared to 13 numbers of irrigation in conventional planting method. Lower number of irrigation in tomatoes with organic mulching resulted low cost involvement of rs. 7695 by the FLD farmer. While in conventional method with no mulching irrigation costs rs 11,115 Ha⁻¹. Increased field water use efficiency of 657.53 kgHa⁻¹-cm was recorded in tomatoes grown with organic mulching plots whereas in conventionally planted tomato plots with no mulching recorded field water use efficiency of 504.95 kgHa⁻¹-cm. Ranjan *et al.* (2017) reported the use of straw as ideal for mulching because it could be easily applied in the field, stayed in place and reflected sunlight which helped to bear fruit in some vegetables.

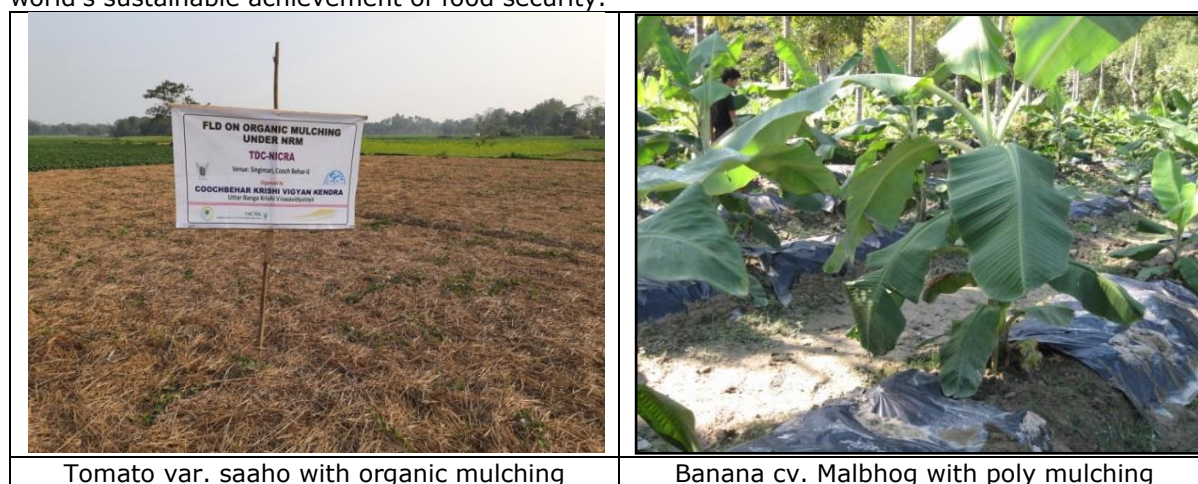
Table 3: Effect of poly-mulching on irrigation in banana

Technology	Irrigation			Yield (t/ha)	FWUE (kg/ha-cm.)
	No.	Water required (ha- cm.)	Cost (Rs./ha)		
Conventional planting of banana with no mulching	12	43.28	9,270	46.84	1,083
Planting of banana with poly mulching	08	33.34	6,180	47.14	1,415

Results on effect of poly-mulching on irrigation in banana (Table 3) indicated that lower requirement of irrigation water in banana with poly mulch was 43.28 Ha-cm as compared to 43.28 Ha-cm requirement in conventional planting with no mulching. The FLD farmer had to invest lower amount of money of Rs 6180 to irrigate the banana orchard where poly mulching was used. The field water use efficiency was recorded 1083 kg/ha-cm in Conventional planting of banana with no mulching and 1415 kg/ha-cm in planting of banana with poly mulching. Similar findings were reported by Nirala *et al.* (2019) who observed that the treatment combined with 80% RDF+0.8V volume of water through drip irrigation+ without mulch in banana produced higher yield (94.87 tonnes Ha⁻¹) which was about 44.72 greater than the control combined with 100%RDF+flood irrigation.

Conclusions

The utilization of poly and straw mulch has played a major role in the increases in production of brinjal, tomato, winter cucumber, okra, chilli and pointed gourd among other vegetables and banana though frontline demonstrations being organized by Cooch Behar Krishi Vigyan Kendra. Poly and straw mulch reduced weed emergence by 60% to 80% during the growing season. Mulches were more effective for weed control. Mulch offered numerous advantages to agricultural production, including shielding plant roots from extreme heat and cold, regulating temperature to promote healthy plant growth, lowering salt concentration in soil, controlling weeds, and enhancing crop yield and quality. Farmers will therefore utilize organic and straw mulching in the coming days as a means of conserving soil moisture, preventing weed growth, and greatly enhancing soil health while increasing crop yields. This will also play a significant role in the world's sustainable achievement of food security.



Tomato var. saaho with organic mulching

Banana cv. Malbhog with poly mulching

Acknowledgement

The authors duly acknowledge the role of ICAR-ATARI Kolkata for financial support and Directorate of Extension Education, Uttar Banga Krishi Viswavidyalaya for institutional support to conduct the study.

References:

- Nirala, S. K., Suresh, R., Gupta, S. P., and Sahu, R.K. (2019) Effect of fertigation and plastic mulching on banana crop in calcareous soil of north bihar. [https://www.icid.org/9imic2019_papers/9th_imic_st1_paper%20\(23\).pdf](https://www.icid.org/9imic2019_papers/9th_imic_st1_paper%20(23).pdf)
- Prem Ranjan, G. T. Patatle, Manjeet Prem and K R Solanke. 2017. Organic Mulching - A Water Saving Technique to Increase the Production of Fruits and Vegetables. Current Agriculture Research Journal. 5 (3): 371-380