



# **TO STUDY THE EFFECT OF 50 MICRON POLY MULCHES WITH FURROW IRRIGATION SYSTEM ON THE YIELD OF WATERMELON CULTIVATION**

**Dr Manendra Pratap Verma**

*Dr Manendra Pratap Verma professor, Civil Engineering deptt. Madhyanchal Professional University  
Bhopal MP*

## **ABSTRACT**-----

Watermelon is a main summer season crop of central India. In summer season water demand in entire India. Due to excess temperature the tropical fruits demands are more in this season. According to the demand various research has been conducted and in this continuation this work was conducted. In this study crop grown on furrow without and with mulch. The flood irrigation (furrow irrigation) was adopted. The 50 micron size was used. As per the experiments the growth factor like average plant length 225.06 cm, 227.76 cm and 226.41 cm, number of 277.92, 281.25 and 279.58 and number of nodes were found in 50 micron white mulch however; the yield factor like; fruits 3.94, 3.98 and 3.96 per plant, weight 3.10 kg, 3.14 kg and 3.12 kg of fruit and yield 2477.27 q, 2506.99 q and 2492.13 q ha<sup>-1</sup> are higher at 50 micron mulch under controlled irrigation and water-based water-based fertilization condition.

**KEY WORDS-** Drip Irrigation, Furrow Irrigation -----

## **INTRODUCTION**

Growing widely in tropical and subtropical regions of the world, watermelon is one of the major cucurbit vegetable fruit crops. With a total production area of 3.5 million hectares and an average fruit yield of 33.82 tons per hectare, watermelon was produced on 118.4 million tonnes of land worldwide. In India, it is a well-liked commercial veggie fruit and dessert fruit. In India, there are around 0.101 million hectares of watermelon grown, with 2.52 million tonnes produced annually. Uttar Pradesh, Andhra Pradesh, Karnataka, West Bengal, Odisha, One The states of Uttar Pradesh, Andhra Pradesh, Karnataka, West Bengal, Odisha, Tamil Nadu, Madhya Pradesh, and Haryana are the main producers of watermelon in India. In Madhya Pradesh, there are around 8.37 thousand hectares dedicated to watermelon agriculture.

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Furrow irrigation is methods receiving wider acceptance and adoption, particularly to make use of the available water with more productivity. Efforts are needed to harness optimized moisture and nutrients to realize higher profit. Furrow irrigation can be quite efficient in water usage, as it allows for precise control over the amount of water delivered to crops. By directing water into furrows or channels between crop rows, it minimizes water loss through evaporation and runoff. Furrow irrigation can be adapted to suit a wide range of crop types and field conditions. It is commonly used for row crops such as maize, cotton, and soybeans, but can also be effective for perennial crops like fruit trees



and vineyards. Furrow irrigation can be quite efficient in water usage, as it allows for precise control over the amount of water delivered to crops. By directing water into furrows or channels between crop rows, it minimizes water loss through evaporation and runoff. furrow irrigation can help promote soil conservation by minimizing erosion and sediment runoff. By delivering water directly to the root zone of plants, it reduces the risk of soil erosion caused by surface water flow.

Through small and controlled amounts of fertilizers added gradually through water-based fertilization, the method has proven to be very innovative and efficient. water-based fertilization ensures higher fertilizer use efficiency, besides providing scope for making soil amendments and even biological methods of plant protection. In the water-based fertilization method, fertilizers can be applied throughout the crop growing season in a phased manner, in various split doses, in any desired concentration.

There are three major colours of plastic mulch used in commercial vegetable production: *i.e.*, black, clear and white reflective mulches. The black mulch is being the dominant colour used for vegetables (Gordon *et al.*, 2010; Hochmuth *et al.*, 2012). White or coextruded white-on black mulch can cause a slightly lower soil temperature in comparison with bare soil because the mulch absorbs less radiant energy and it reflects back into the plant canopy most of the incoming solar radiation (Ham *et al.*, 1993; Lamont, 2005). However, there is lacking of academic information on watermelon production in summer season using suitable irrigation method along with polythene mulch of different thickness and colour in Malwa Region of Madhya Pradesh. Keeping this fact in view, the present study entitled was conducted to determine the effects of irrigation methods along with various thicknesses and colours of polythene mulch.

### **Experimental location**

*The experimental field is located at 22° 86' N latitude and 75° 98' E longitude at a height of 552.5m above the mean sea level in the Malwa Plateau Agro-climatic region under the Western part of the state of Madhya Pradesh.*

### **Climate and weather**

*The climate of Indore is sub-tropical with hot and dry summers where maximum temperature exceeds 41°C in May and June. The winters are cool and minimum temperature reaches as low as 7°C in December and January. Usually the monsoon arrives in the second fortnight of June and lasts till September. The rainfall in the region has been mostly inadequate and erratic in most of the recent past seasons. Late commencement, early withdrawal of monsoon and occurrence of two to three dry spells during the rainy season are the common features. The mean annual average rainfall is 954 mm. The weekly meteorological data viz., rainfall, temperature and relative humidity during the crop season for both the years were recorded from meteorological observatory of College of Agriculture, Indore.*

## **MATERIALS AND METHODS**

### **1-Experimental details**

The experiment was conducted at the research farm, Department of Agronomy, College of Agriculture, Gwalior during the *rabi* season of 2021 – 23. The layout plan of the experiment is illustrated in fig. 2 and the detail of experiment is as under:

Crop	: Watermelon
Variety	: Kiran
Number of treatment combinations	: 15
Number of replications	: 3
Main plot size	: 20 m × 4 m
Sub plot size	: 4 m × 4 m
Total number of main plots	: 3

### **1.2 Treatment Details**

#### **A. Main Plot**

#### **Irrigation Methods**

1. Irrigation in channels (Furrows) at 100% of CPE (I<sub>1</sub>)
2. Irrigation in alternate channels (Furrows) at 80% of CPE (I<sub>2</sub>)
3. Drip irrigation with water-based fertilization system at 80% of CPE (I<sub>3</sub>)



**Polythene Mulch**

1. Without mulching ( $M_0$ )
2. Mulching with white polythene of 50 micron thickness ( $M_1$ )

**RESULT AND DISCUSSION**

The above treatments were followed for the conduction of experiment. The following results were tabulated in different tables. The experimental results are given in below and discussed accordingly.

**Table-1 Plant Growth at different treatments in different years**

Treatment		Length of the plant (cm)				Number of nodes plant <sup>-1</sup>				Number of leaves plant <sup>-1</sup>			
		2021	2022	2023	Average	2021	2022	2023	Average	2021	2022	2023	Average
<b>Factor A. Irrigation methods (I)</b>													
<b>I<sub>1</sub></b>	Irrigation in channels (Furrows) at 100% of CPE	202.03	202.60	205.03	203.22	42.79	42.79	43.31	42.96	254.54	254.54	257.59	255.56
<b>I<sub>2</sub></b>	Irrigation in alternate channels (Furrows) at 80% of CPE	186.84	186.84	189.08	187.58	36.97	37.42	37.42	37.27	244.47	245.47	248.41	246.12
<b>SEm±</b>		<b>2.27</b>	<b>2.28</b>	<b>2.28</b>	<b>2.28</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.62</b>	<b>1.61</b>	<b>1.62</b>	<b>1.62</b>
<b>CD at 5% level</b>		<b>8.87</b>	<b>8.89</b>	<b>8.91</b>	<b>8.91</b>	<b>3.89</b>	<b>3.87</b>	<b>3.93</b>	<b>3.89</b>	<b>6.24</b>	<b>6.27</b>	<b>6.34</b>	<b>6.28</b>
<b>Factor B. Polythene mulch (M)</b>													
<b>M<sub>0</sub></b>	Without mulching	175.84	176.85	178.97	177.22	33.68	33.58	34.08	33.44	234.76	235.66	238.49	236.30
<b>M<sub>1</sub></b>	Mulching with white polythene of 50 micron thickness	226.96	227.60	230.34	228.30	51.65	52.26	52.27	52.06	278.08	277.92	281.25	279.08

**1- Vegetative Growth characters**

The various growth factor like plant length, Number of nodes per plant and Number of leaves per plant were considered and results are given in table 1.

The data pertaining to the effect of irrigation methods on plant length is presented in table 1 which revealed that different methods of irrigation had significant effect on plant length of watermelon. The plant length in different irrigation conditions has been recorded significantly higher plant length (203.22 cm, 187.58 cm), average number of nodes per plant were found to be (42.96, 37.27) and average number of leaves per plant were found to be (255.56, 246.12) respectively in I<sub>1</sub> and I<sub>2</sub> treatment methods. As per results I<sub>1</sub> treatment is better than I<sub>2</sub>. It may be due to irrigation characteristics of I<sub>1</sub> treatment. However; in mulching treatment, the average plant length in case of M<sub>0</sub> and M<sub>1</sub> were found to be (177.22 cm, 228.30 cm) and the average number of nodes per plant were found to be (33.44, 52.06) however the average number of leaves per plant were found to be (236.30, 279.08) respectively. It is evident from the table 1, plant length is comparatively higher in case of I<sub>1</sub> mulching condition. and average number of leaves (255.56, 246.12) were found in M<sub>0</sub> and M<sub>1</sub> irrigation treatment methods respectively. As per mulch treatment M<sub>0</sub> (without mulch) and M<sub>1</sub> (with mulch), all plant growth parameter like, plant length, number of nodes and number of leaves per plant is more in comparison of M<sub>0</sub> treatment.



**Table-2 Yield of watermelon at different treatments in different years**

Treatment		Number of fruits plant <sup>-1</sup>				Average fruit weight (kg)				Yield (eq ha <sup>-1</sup> )			
Factor A. Irrigation methods (I)		2021	2022	2023	Average	2021	2022	2023	Average	2021	2022	2023	Average
I <sub>1</sub>	Irrigation in channels (Furrows) at 100% of CPE	3.28	3.32	3.32	3.31	2.67	2.66	2.69	2.67	1766.29	1786.48	1787.48	1780.08
I <sub>2</sub>	Irrigation in alternate channels (Furrows) at 80% of CPE	2.63	2.67	2.67	2.66	2.41	2.40	2.43	2.41	1290.84	1300	1306.33	1299.06
		Factor B. Polythene mulch (M)											
M <sub>0</sub>	Without mulching	2.57	2.53	2.55	2.55	2.29	2.33	2.35	1.56	1194.86	1194.86	1209.20	1199.64
M <sub>1</sub>	Mulching with white polythene of 50 micron thickness	3.94	3.95	3.98	3.96	3.11	3.10	3.14	3.12	2477.27	2478.27	2506.99	2487.51

## 2- Yield Characters

The various yield factor like Number of fruits per plant, Average fruit weight (kg) and Yield (q ha<sup>-1</sup>) characters are given in table 1.

### 2.1 Number of Fruits Plant<sup>-1</sup>

It is apparent from data presented in table 2 that number of fruits per plant was significantly affected by irrigation methods. The maximum average number of fruits per plant, Average fruit weight and Yield were found (3.31, 2.66, 1780.08) respectively in I<sub>1</sub> irrigation condition, however; in I<sub>2</sub> condition the average value of of fruits per plant, Average fruit weight and Yield were found (2.66, 2.41, 1299.06). As per table 2 the number of fruits per plant, Average fruit weight and Yield were found in I<sub>1</sub> irrigation condition. It is due to irrigation condition of each furrow watering. However; in I<sub>2</sub>, alternate channel irrigation method the number of fruits per plant, average fruit weight and Yield were found comparatively low in comparison of each channel irrigation method.

In other treatment of irrigation like without and with 50 micron white Mulch, the average number of fruits per plant, average fruit weight and yield were found (2.55, 1.56, 1199.64) respectively in M<sub>0</sub> treatment and the average number of fruits per plant, average fruit weight and yield were found(3.96, 3.12, 2487.51) were obtained with treatment M<sub>1</sub>(with mulch).All the parameters of yield are greater in comparison of I<sub>1</sub>, I<sub>2</sub> and M<sub>0</sub> treatments. The water quality and fertilizer quantity were same. So the difference in yield may be reason of mulch.

### Conclusions

According to the experimental data it was concluded that the plant length, number of nods and number of leaves per plant are higher and parameters of yield like; number of fruits per plant, average fruit weight and yield were found more in 50 micron white mulch with furrow irrigation.

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