# Effect of seed priming and moisture conservation measures on growth and yield of baby corn (*Zea mays* L.) under rainfed upland situation


## Abstract

**A** field experiment was conducted during *rabi*, 2019-20 and 2020-21 at the PG experimental plot of the Department of Agronomy, BNCA to assess seed priming and moisture conservation measures on productivity and profitability of baby corn under the rainfed situation. The soil of the experimental site was acidic (pH 4.64), sandy loam in texture, medium in organic carbon (0.64%), low in available N (232.06 kg $ha^{-1}$), $P_2O_5$ (13.84 kg $ha^{-1}$) and $K_2O$ (115.27 kg $ha^{-1}$). The experiment was laid out in factorial randomized block design with 4 levels of seed priming methods. $S_0$: No priming; $S_1$: Seed priming with 1% urea solution; $S_2$: priming with 1% potash solution (MOP); $S_3$: priming with 3 times diluted cow urine and 3 levels of soil moisture conservation measures *viz*. $M_0$: No mulching; $M_1$: use of bio mulch; $M_2$: use of black polythene mulch. Results revealed that the highest and quickest seedling emergence (11.96 numbers $m^{-2}$) was recorded under the treatment of seed priming with three times diluted cow urine which was at par with the treatment of seed priming with 1% urea and 1% KCl (MOP) solution. The total number of leaves $m^{-2}$, total leaf area $plant^{-1}$ and leaf area index (LAI) of baby corn were also changed significantly due to different moisture conservation measures but those parameters remain static due to different seed priming methods. The CGR (g $m^{-2}$ $day^{-1}$), RGR, (g $g^{-1}$ $day^{-1}$) and NAR (mg $cm^{-1}$ $day^{-1}$) of baby corn were also changed significantly due to different soil moisture conservation measures. The highest and most significant baby corn yield without husk(22.59 q $ha^{-1}$) with 305.61 q $ha^{-1}$ of green fodder yield along with harvest index (6.00), production efficiency (25.67 $kg^{-1}$ $day^{-1}$ $ha^{-1}$) and nutrient use productivity (9.41 $kg^{-1}$ $ha^{-1}$ $kg^{-1}$) were recorded under the treatment where black polythene mulching was used as soil moisture conservation measure.



**Keywords: Babycorn, seed priming, moisture conservation measures, production efficiency, Fertilizer use efficiency**




**Introduction**

"Maize" (*Zea mays* L.) one of the most versatile cereal crops of the world belongs to the *Gramineae* family. Maize is regarded as the third major cereal crop after wheat and rice in world production (Zamir *et al*., 2013). The various specialty maize types are quality protein maize (QPM), baby maize, sweet maize, pop maize, waxy maize, high oil maize etc. In recent times, QPM, baby and sweet maize types are becoming popular among Indian farmers (Bhargaw, *et al*., 2019). Baby maize is a young finger-like unfertilized cob with 1-3 cm emerged silk preferably harvested within 1-3 days of silk emergence, depending on the growing season. Cultivation of maize is done in all the growing seasons viz. summer, kharif and winter, but being a sensitive crop to deficient moisture as well as excess water, it is desirable to adopt water conservation practices. Preserving soil moisture is an important means to maintain the necessary water and also helps to minimize the irrigation needs of the crop, which can be achieved through mulching which is the easiest way to conserve the soil moisture during dry periods. Mulching conserves soil water by reducing soil evaporation and regulates soil temperature. The selection of mulch materials largely depends on the availability of material, climate, durability, and cost-effectiveness. Again, the losses during this crop period can be overcome by the seed priming method to increase the germination percentage and to provide a better field establishment. Seed priming is a process known for its controlled hydration of seeds to a particular level that will only permit the pre-germinative metabolic activity, but prevent the actual emergence of the radical (Farooq *et al*., 2006). Seed priming practices before sowing can induce a better physiological status in seeds and can emerge as a promising strategy to improve better plant behaviour in the field.

Thus, the present study was undertaken to assess a few seed priming (SP) and moisture conservation measures (MCM) on baby corn grown during *rabi* season to evaluate the performance under upland land rainfed situations.

**Materials and methods**

A field experiment was conducted in the PG experimental field of the Department of Agronomy, Biswanath College of Agriculture during the *rabi* season of 2019-20 and 2020-21. The site was located at 26°7260′N latitude and 93°1330′E longitude having an elevation of 86.70 m above mean sea level. The experimental site falls in the Sub-tropical climatic region and enjoys a monsoon type of climate. Summer is hot and humid; with an average temperature of 29°C. Summer rain is heavy, which is a boon for providing natural water to the fields but winters extend from October to February and are cold and generally dry, with an average temperature of 16° C. The total rainfall received during the crop growth period was 175 mm. The weekly mean maximum temperature ranged from 23.54ºC to 33.24ºC and the weekly mean minimum temperature ranged from 5.53ºC to 23.30ºC. The weekly average relative humidity during morning hours ranged from 90.00 percent to 95.86 percent while evening relative humidity ranged from 51.86 percent to 75.00 percent. The experimental field was sandy loam in texture with a pH of 4.64 with a soil organic carbon content of 0.65%. The soil was low in available nitrogen content (232.06 kg/ha), low in available phosphorus (13.84 kg/ha) and low in available potassium (115.27 kg/ha).

The experiment was laid out in a Factorial Randomised Block Design with three replications and two treatment factors *viz*. Seed priming (SP) with four levels *i.e*., $S_0$: No priming, $S_1$: Seed priming with 1% urea solution, $S_2$: Seed priming with 1% MOP solution and $S_3$: Seed priming with 3 times diluted cow urine and moisture conservation measures (MCM) with three levels *i.e*., $M_0$: No MCM, $M_1$: Use of bio-mulching and $M_2$: Use of black polythene mulch. The baby corn variety “golden baby” was sowed during the first fortnight of October and immature cobs were harvested from the middle of December. A fertilizer dose of 120:60:60 N:$P_2O_5$:$K_2O$ kg $ha^{-1}$ with a full dose of nitrogen, phosphorus and potash was applied in the furrows before sowing. Intercultural operations were carried out as per the requirement of crop. Baby corn was evaluated in terms of growth parameters like plant height at every 10 day intervals till harvest, Crop Growth Rate (CGR), Relative Growth Rate (RGR), Number of leaves per plant, Leaf Area ($mm^2$), Leaf Area Index (LAI), Net Assimilation Rate (NAR), Chlorophyll content index, Dry matter accumulation (g $plant^{-1}$)and collar diameter (cm). Again, yield attributing parameters were evaluated like Plant population (no. $m^{-2}$), days to cob emergence, number of cobs per plant, the weight of cob with husk (g $cob^{-1}$), weight of cob without husk (g $cob^{-1}$), length of cob with husk (cm), length of cob without husk (cm), girth of baby corn (cm) and for yield parameters like cob yield with and without husk (q ha$^{-1}$), green fodder yield (q ha$^{-1}$), Harvest Index (%), production efficiency (kg day$^{-1}$ ha$^{-1}$) and nutrient use productivity (kg ha$^{-1}$ kg$^{-1}$).

## Result and discussion

### Growth characters of Babycorn

The seed priming treatment with 3 times diluted cow urine had a significant effect on the initial growth stages of the crop and a higher plant height at 10 days after sowing (28.24 cm) was recorded over the control (24.83 cm) which might be due to better utilization of water and nutrients during early growth stages because of improved root system and shoot growth. The effect of different moisture conservation measures was found to be significant at all the growth stages of baby corn. A significant plant height (177.36 cm) was recorded at 70 DAS under black polythene mulch treatment whereas the lowest plant height (152.33 cm) was recorded in control (Table 1). The reason behind such a trend may be due to excellent weed control, regulation of soil temperature and better availability of soil moisture under black polythene mulch. The results conform with the findings of Tian *et. al.* (2014) and Basu, *et. al.* (2005).

Seed priming significantly affected the plant population at both 10 DAS and 30 DAS. At both time intervals, seed priming with 3 times diluted cow urine had a significantly higher plant population over the control *i.e*., 14.22 no. m$^{-2}$ at 10 DAS and14.56 no. m$^{-2}$ at 30 DAS (Table-1). Improved plant population is probably the result of a higher final emergence percentage. Similar results regarding plant population were reported by Hussain *et al.* (2006). The effect of moisture conservation measures was found to be non-significant in terms of plant population for the time interval recorded. However, the highest plant population (11.89 m$^{-2}$ at 10 DAS and 13.92 m$^{-2}$ at 30 DAS) was recorded for black polythene mulch treatment at both the period which might be due to the better moisture conserved by the black polythene mulch.

Seed priming treatment has shown no significant difference in terms of collar diameter, length and girth of baby corn but the effect of moisture conservation measures was found to be significant. The maximum collar diameter (7.48 cm) was recorded under black polythene mulch which might be due to the effect of moisture conservation by using different mulching materials and the lowest collar diameter (6.88 cm) was recorded under the treatment, where no moisture conservation measure was taken (Table-1). The result of Saleem *et al.* (2017) revealed that the effect of seed priming is non-significant in terms of the length of the cob.

### Chlorophyll Content Index

The effect of seed priming was found to be non-significant at both 30 DAS and 50 DAS in terms of the Chlorophyll Content Index. The effect of moisture conservation measures was found to be significant at 30 DAS but non-significant at 50 DAS concerning the Chlorophyll Content Index. The highest value (31.62 at 30 DAS and 30.70 at 50 DAS) was recorded under black polythene mulch treatment which was statistically higher than straw mulch and the control (Table 2).

**Leaf Area Index (LAI), Crop Growth Rate (CGR) and Net Assimilation Rate (NAR)**

The different growth rates *i.e.*, Relative Growth Rate (RGR), Crop Growth Rate (CGR) and Net Assimilation Rate (NAR) showed no significant difference among the different priming treatments (Table 2). Murungu *et al*. (2004) also reported that seed priming had no significant effect on leaf area and number of leaves per plant of both maize and cotton. The maximum Leaf Area Index (1.12 at 30 DAS and 3.30 at 50 DAS) was recorded under black polythene mulch treatment which was found to be statistically higher over the control (No mulch). According, to the findings of Xu *et al.* (2015), the higher growth rate promoted a greater LAI, which made it possible to maintain high levels of photosynthesis in the leaves. The effect of moisture conservation measures at both 30 DAS and 50 DAS was found to be statistically significant in the case of crop growth rate. The moisture conservation measure with black polythene mulch treatment showed the highest CGR value (59.15 g $m^{-2}$ $day^{-1}$ at 30 DAS and 18.32 g $m^{-2}$ $day^{-1}$ at 50 DAS) over the control at both time intervals. The effect of moisture conservation measures was found to be significant at 30 DAS but found to be non-significant at 50 DAS in the case of RGR. The moisture conservation measure with black polythene mulch treatment recorded the highest RGR value (0.092 g $g^{-1}$ $day^{-1}$ at 30 DAS) over the control. The effect of moisture conservation measures was found to be statistically significant at both 30 DAS and 50 DAS in terms of NAR. The effect of moisture conservation measure with black polythene mulch recorded maximum NAR (5.56 mg $cm^{-2}$ $day^{-1}$ at 30 DAS and 17.28 mg $cm^{-2}$ $day^{-1}$ at 50 DAS) over the control.

**Dry matter accumulation**

The effect of seed priming was found to be non-significant at both 30 DAS 50 DAS and 70 DAS in terms of dry matter accumulation. According to, to Murungu *et al*. (2010), seed priming failed to show any significant difference for dry matter accumulation in maize. The effect of moisture conservation measures on dry matter accumulation was found to be significant at 50 and 70 DAS. However, it was statistically non-significant at 30 DAS. The highest value (83.84 at 50 DAS and 138.34 at 50 DAS) was recorded under black polythene mulch treatment which was statistically higher than straw mulch and the control (Table 2). Kwabiah *et al.* (2003) observed that microclimate modification induced by plastic mulch improved dry matter accumulation and its favourable distribution which in turn improved yield and yield attributing characters in baby corn.

**Days to cob emergence**

Seed priming has shown no significant effect on days to cob emergence. The effect of moisture conservation measures was found to be significant in terms of number of days to cob emergence (Table 2). The lesser number of days (60.89 days) required for cob emergence was recorded for black polythene treatment which was statistically significant over straw mulch (61.56 days) and control (65.11 days). The earliness of cob emergence under plastic mulch may be due to the increased metabolic activities accompanied by higher moisture and temperature.

**Number of cobs per plant**

The effect of seed priming was found to be non-significant in the case of several cobs per plant. However, the maximum cobs per plant (3.45) were recorded for seed priming with 3 times diluted cow urine. The effect of moisture conservation measures was found to be non-significant. The treatment under black polythene mulch recorded the highest number of cobs per plant (3.11 cobs) and the lowest (2.68 cobs) recorded under control (Table 3).

**Weight of cob with and without husk**

The effect of seed priming was found to be statistically non-significant in respect of the weight of cob without husk but significantly, a higher weight of cob was recorded under the use of black polythene mulch (55.01 g $cob^{-1}$) over straw mulch and control. The lowest weight of cob (35.21 g $cob^{-1}$) with husk was noticed under no mulch treatment. On the other hand, a significantly higher weight of cob was recorded under black polythene mulch (8.13 g $cob^{-1}$). However, the lowest weight of cob without husk (5.84 g $cob^{-1}$) was noticed under no mulch treatment (Table 3).

**Yield of cob with and without husk**

The effect of seed priming failed to show any significant difference with respect to the yield of cob with husk and without husk but a higher weight of cob (with husk) was recorded under bio-mulching (88.97 q $ha^{-1}$) over control (Table 3). The lowest weight of the cob with husk (70.67 q $ha^{-1}$) was noticed under the black polythene mulch treatment. On the other hand, the significant effect of moisture conservation measures was observed on the yield of cob without husk. Significantly, higher cob yield (without husk) was recorded under black polythene mulch (22.59 q $ha^{-1}$) over straw mulch and control. The lowest cob yield without husk (17.95 q $ha^{-1}$) was noticed under no mulch treatment. The significant increase in cob was due to a higher number of cobs $plant^{-1}$, higher cob weight and cob girth. The presence of a cover applied in mulching on the soil preserves the humidity of the soil, promoting a microclimate favourable to microbial life, which has the direct consequence of improving the physiochemical properties of the soil which in turn improves the yield and yield attributing traits of baby corn.

**Green fodder yield**

The effect of seed priming was found to be statistically non-significant with respect to green fodder yield but significantly higher green fodder yield (305.61q $ha^{-1}$) was recorded with treatment use of black polythene mulch over straw mulch and control (Table 3). The lowest green fodder yield (289.91 q $ha^{-1}$) was noticed under no mulch treatment. Higher green fodder yield is due to the higher plant height and more vegetative growth under black polythene mulch over bio-mulching and control.

**Harvest Index**

The effect of seed priming failed to show any significant difference with respect to the harvest index. Similar findings were recorded by Murungu *et al.* (2004). The significant effect of moisture conservation measures was observed on the harvest index. A significantly higher harvest index was recorded under black polythene mulch (6.00%) over straw mulch and control. The lowest harvest index (4.78 %) was noticed under no mulch treatment (Table 3).

**Production efficiency**

The effect of seed priming was found to be statistically non-significant in respect of production efficiency whereas, the significant effect of MCM was observed on production efficiency. Significantly higher production efficiency was recorded under black polythene mulch (25.67kg $day^{-1}$ $ha^{-1}$) over straw mulch and control. The lowest production efficiency (20.40 kg $day^{-1}$ $ha^{-1}$) was noticed under no mulch treatment (Table 3). The results conform with the findings of Mahajan *et al.* (2003).

**Fertilizer use efficiency**

The effect of seed priming was found to be statistically non-significant in respect of fertilizer use efficiency. Afzal *et al.* (2013) revealed that seed priming has no significant effect on fertilizer use efficiency. On the other hand, a significant effect of MCM was observed on fertilizer use efficiency. Significantly higher fertilizer use efficiency was recorded under black polythene mulch (9.41 kg $ha^{-1}$ $kg^{-1}$) over control. The lowest fertilizer use efficiency (7.48 kg $ha^{-1}$ $kg^{-1}$) was noticed under no mulch treatment (Table 3).

**Conclusion**

Among all the seed priming treatments, seed priming with 3 times diluted cow urine showed a significant effect in terms of plant height at 10 DAS and plant population at both 10 and 30 DAS. All the other growth parameters, yield attributing parameters and yield parameters failed to show any significant effect for seed priming treatments.

Again, under moisture conservation measures mulching with black polythene mulch recorded superior performance for different growth, yield attributing parameters and yield of baby corn.

Based on the results of the present investigation it can be concluded that the baby corn can be grown during the *rabi* season under rainfed upland situations with seed priming with 1% urea solution, 1% potash (MOP) or 3 times diluted cow urine for 8 hours along with the use of black polythene mulch as the moisture conservation measure for higher growth and yield of the crop.

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**Table-1: Effect of treatments on growth parameters of babycorn**

| Treatments | Plant height (cm) | | Plant population (no. $m^{-2}$) | | Collar diameter (cm) | LAI | | Dry matter accumulation (g $plant^{-1}$) | |
|---|---|---|---|---|---|---|---|---|---|
| | 10 DAS | 70 DAS | 10 DAS | 30 DAS | | 30 DAS | 50 DAS | 50 DAS | 70 DAS |
| **Seed Priming (S)** | | | | | | | | | |
| S0: No priming | 24.83 | 162.11 | 10.56 | 10.78 | 7.14 | 1.13 | 3.10 | 61.53 | 117.23 |
| S1: Seed priming with 1% urea solution | 27.41 | 168.44 | 13.67 | 13.98 | 6.83 | 1.08 | 3.39 | 64.27 | 120.54 |
| S2: Seed priming with 1% potash solution | 27.43 | 160.78 | 13.44 | 14.54 | 7.51 | 1.06 | 3.10 | 71.61 | 121.98 |
| S3: Seed priming with 3 times diluted cow urine | 28.24 | 161.70 | 14.22 | 14.56 | 6.61 | 1.06 | 3.31 | 30.59 | 115.34 |
| SE(d) | 0.63 | 5.57 | 1.58 | 1.62 | 0.66 | 0.053 | 0.17 | 5.04 | 6.35 |
| C.D.(P=0.05) | 1.342 | NS | 2.53 | 2.53 | NS | NS | NS | NS | NS |
| **Moisture Conservation measures (M)** | | | | | | | | | |
| M0: No MCM | 23.44 | 152.33 | 11.19 | 11.96 | 6.88 | 1.02 | 3.08 | 69.30 | 126.45 |
| M1: Use of bio-mulching | 26.55 | 160.08 | 11.73 | 13.58 | 6.71 | 1.10 | 3.30 | 75.36 | 131.21 |
| M2: Use of black polythene mulch | 27.45 | 177.36 | 11.89 | 13.92 | 7.48 | 1.12 | 3.30 | 83.84 | 138.34 |
| S.E(d) | 1.55 | 4.82 | 0.29 | 1.24 | 0.23 | 0.032 | 0.10 | 4.36 | 5.76 |
| C.D.(P=0.05) | 3.65 | 10.00 | NS | NS | 0.98 | 0.09 | 0.09 | 9.05 | 9.21 |
| **Interaction (S×M)** | | | | | | | | | |
| SE(d) | 1.09 | 9.65 | 7.94 | 6.28 | 0.47 | 0.09 | 0.29 | 8.73 | 8.96 |
| CD (P=0.05) | 3.265 | NS | NS | NS | NS | NS | NS | NS | NS |

- **Data represented average of two years of experiments.**

**Table-2: Effect of treatment on growth parameters of babycorn**

| Treatments | Chlorophyll content index | | CGR (g $m^{-2}$ $day^{-1}$) | | RGR (g $g^{-1}$ $day^{-1}$) | | NAR (mg $cm^{-2}$ $day^{-1}$) | | Days to cob emergence | Length (cm) | | Girth (cm) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 30 DAS | 50 DAS | 30-50 DAS | 50-70 DAS | 30 DAS | 50 DAS | 30 DAS | 50 DAS | | Without husk | With husk | Without husk | With husk |
| **Seed Priming(S)** | | | | | | | | | | | | | |
| S0: No priming | 29.17 | 26.50 | 42.84 | 12.57 | 0.061 | 0.011 | 3.56 | 14.70 | 65.56 | 23.79 | 6.89 | 7.53 | 5.13 |
| S1: Seed priming with 1% urea solution | 28.63 | 28.88 | 44.04 | 15.32 | 0.072 | 0.014 | 3.79 | 13.22 | 64.33 | 23.00 | 7.18 | 7.96 | 5.29 |
| S2: Seed priming with 1% potash solution | 28.75 | 31.97 | 43.78 | 14.34 | 0.071 | 0.013 | 3.20 | 13.80 | 64.58 | 23.86 | 7.18 | 7.75 | 5.11 |
| S3: Seed priming with 3 times diluted cow urine | 27.69 | 26.42 | 47.82 | 15.43 | 0.033 | 0.015 | 3.17 | 13.15 | 63.17 | 23.31 | 6.68 | 6.90 | 5.04 |
| SE(d) | 1.36 | 2.52 | 3.21 | 2.96 | 0.01 | 0.17 | 0.36 | 1.13 | 0.92 | 0.40 | 0.12 | 0.20 | 0.12 |
| C.D.(P=0.05) | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| **Moisture Conservation measures (M)** | | | | | | | | | | | | | |
| M0: No MCM | 27.57 | 26.03 | 48.94 | 13.13 | 0.052 | 0.021 | 3.69 | 13.58 | 65.11 | 23.17 | 6.49 | 7.17 | 5.05 |
| M1: Use of bio-mulching | 26.49 | 28.60 | 53.15 | 16.43 | 0.074 | 0.027 | 3.79 | 15.80 | 61.56 | 22.40 | 6.78 | 7.28 | 5.16 |
| M2: Use of black polythene mulch | 31.62 | 30.70 | 59.15 | 18.32 | 0.092 | 0.031 | 5.56 | 17.28 | 60.89 | 24.89 | 7.68 | 8.15 | 6.32 |
| S.E(d) | 1.18 | 2.18 | 2.78 | 2.57 | 0.01 | 0.03 | 0.31 | 0.98 | 0.80 | 0.35 | 0.10 | 0.35 | 0.11 |
| C.D.(P=0.05) | 2.45 | NS | 5.71 | 4.21 | 0.02 | NS | 0.65 | 2.02 | 1.66 | 0.73 | 0.21 | 0.36 | 0.77 |
| **Interaction (S×M)** | | | | | | | | | | | | | |
| SE(d) | 2.36 | 4.37 | 5.56 | 5.34 | 0.02 | 0.02 | 0.63 | 1.95 | 1.60 | 0.70 | 0.21 | 0.35 | 0.22 |
| CD (P=0.05) | 4.90 | 9.08 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |

- **Data represented average of two years of experiments.**

**Table-3: Effect of different treatments on yield attributes and yield of babycorn**

- **Data represented average of two years of experiments.**

| Treatments | Number of cob $plant^{-1}$ | Baby corn wt (g) | | Yield (q $ha^{-1}$) | | Green fodder yield (q $ha^{-1}$) | Harvest index | Production efficiency ($Kg^{-1}$ $Day^{-1}$ $ha^{-1}$) | Nutrient use efficiency ($Kg^{-1}$ $ha^{-1}$ $kg^{-1}$) |
|---|---|---|---|---|---|---|---|---|---|
| | | With husk | Without husk | With husk | Without husk | | | | |
| **Seed Priming (S)** | | | | | | | | | |
| S0: No priming | 2.75 | 46.74 | 7.05 | 81.86 | 19.04 | 294.49 | 5.06 | 21.64 | 7.93 |
| S1: Seed priming with 1% urea solution | 3.16 | 44.07 | 6.84 | 83.05 | 20.22 | 304.58 | 5.22 | 22.98 | 8.43 |
| S2: Seed priming with 1% potash solution | 2.98 | 46.13 | 7.29 | 84.90 | 20.73 | 309.16 | 5.26 | 23.55 | 8.64 |
| S3: Seed priming with 3 times diluted cow urine | 3.45 | 45.59 | 6.18 | 82.76 | 20.72 | 299.39 | 5.42 | 23.54 | 8.63 |
| SE(d) | 0.26 | 0.78 | 0.95 | 1.92 | 0.63 | 5.78 | 0.23 | 1.11 | 0.86 |
| C.D.(P=0.05) | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| **Moisture Conservation measures (M)** | | | | | | | | | |
| M0: No MCM | 2.68 | 35.21 | 5.84 | 85.28 | 17.95 | 289.91 | 4.78 | 20.40 | 7.48 |
| M1: Use of bio-mulching | 3.05 | 39.18 | 6.54 | 88.97 | 19.99 | 293.70 | 5.22 | 22.72 | 8.33 |
| M2: Use of black polythene mulch | 3.11 | 55.01 | 8.13 | 70.67 | 22.59 | 305.61 | 6.00 | 25.67 | 9.41 |
| S.E(d) | 0.23 | 0.24 | 0.13 | 4.26 | 0.54 | 5.01 | 0.69 | 0.62 | 0.73 |
| C.D.(P=0.05) | NS | 0.51 | 0.27 | 8.84 | 1.13 | 10.39 | 1.35 | 1.28 | 1.27 |
| **Interaction (S×M)** | | | | | | | | | |
| SE(d) | NS | NS | NS | NS | NS | NS | 1.04 | 1.23 | 1.15 |
| CD (P=0.05) | 9.59 | 9.40 | 12.73 | 12.79 | 6.59 | 14.54 | NS | NS | NS |

- **Data represented average of two years of experiments.**