International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
IJCS 2019; 7(5): 2794-2797

Received: 19-07-2019
Accepted: 21-08-2019

SS Pinjari
Assistant Professor of Agronomy, College of Agriculture, Dr. BSKKV, Dapoli, Maharashtra, India

NA Meshram
Soil Scientist, Dr. BSKKV, Dapoli, Maharashtra, India

DN Jagtap
Assistant Professor of Agronomy, College of Agriculture, Dr. BSKKV, Dapoli, Maharashtra, India

RR Rathod
Assistant Professor of Plant Pathology, Dr. BSKKV, Dapoli, Maharashtra, India

AS Gawali
Assistant Professor Dr. BSKKV, Dapoli, Maharashtra, India

Corresponding Author:
NA Meshram
Soil Scientist, Dr. BSKKV, Dapoli, Maharashtra, India

Effect of polythene mulch, growth stimulants, organic and chemical fertilization on the yield and profitability of sweet corn

SS Pinjari, NA Meshram, DN Jagtap, RR Rathod and AS Gawali

Abstract
A field experiment was conducted on the effect of polythene mulch, growth stimulants, organic and chemical fertilization on the yield and profitability of sweet corn at research farm of DBSKKV, Dapoli revealed that the cob yield total biological yield, green fodder yield, gross and net returns, were significantly higher under 75% RDN + 25% N through PM, under polythene mulch and growth stimulants during both the years and in the mean of two years except B : C ratio which was significantly higher under 100% RDN and control than rest of the nutrient sources and no mulch and without growth stimulants during both the years and mean of two years respectively.

Keywords: INM, polythene mulch, growth stimulants, yield, economics

Introduction
Today, for the country of India's dimension, with no scope for horizontal expansion and complexity of problems and challenges, there is no alternative but continue to improve productivity without further degrading its natural resources that too in a sustainable manner (Narayanswamy, 1994). In this contest we will have to adopt a rationalist organic farming approach to have an 'Evergreen Revolution'. This has led to the concept of Integrated Nutrient Management (INM) gain momentum in recent years to improve and maintain the soil health. Polythene mulch is the new technology and it increases the soil temperature by 2.2 to 3.6 ^{0}C than the normal cultivation (Tang and Xu, 1986) [7]. There is early germination under polythene mulch and initial crop growth is also better. It is creating better micro environment and better retention of soil moisture, increase in temperature leading ultimately to higher yield. Better germination and early corn initiation and flowering were also observed under polythene mulch (Mahale *et al*. 2002) [4]. Panchagavya is a foliar nutrition. In Sanskrit, Panchagavya means the blend of five products obtained from cow viz. ghee, milk, curd, cow dung and cow urine. Essential plant nutrients naturally occurring beneficial microorganism and plant protection substances in Panchagavya, might have enhanced the higher productivity in all the crops (Somasundaram, 2003). Therefore, research started on Panchagavya in recent years and information is very meager.

Material and Methods
A field experiment was conducted at Agronomy Farm, College of Agriculture, Dapoli, Maharashtra. The soil of experimental plot was classified as lateritic, sandy clay loam in texture, slightly acidic in reaction and medium in organic carbon content. The soil was low in available nitrogen content, medium in available P_2O_5 and low in available K_2O content, during both the years. The experiment was laid out in split-split plot design. The main plot treatments comprised of four nutrient sources (100% RDN, 75% RDN + 25% N as PM, 50% RDN + 50% N as PM and 100% N as PM), while the sub-plot treatments comprised of two levels of mulches (control and transparent polythene mulch) and sob-sub plot treatments comprised of two levels of growth stimulants (control and growth stimulants). Thus, there were 16-treatment combinations, replicated thrice. The treatment details are given in Table 1.

Table 1: Details of treatments and symbols used

Symbol	Treatments
	Main plot treatments
F_1	100% RDN through chemical fertilizer
F_2	75% RDN through chemical fertilizer + 25% N through poultry manure
F_3	50% RDN through chemical fertilizer + 50% N through poultry manure
F_4	100% N through poultry manure
	Sub plot treatment
M_1	Transparent polythene mulch
M_0	Control
	Sub-sub plot treatment
P_1	3% panchagavya spray and amrutpani through irrigation.
P_0	Control

The poultry manure and NPK fertilizes to the sweet corn crop were applied as per the main plot treatment taking in to account the following recommended dose 225:60:60 kg NPK ha^{-1}. The poultry manure, single super phosphate and muirate of potash were applied at the time of sowing; single super phosphate and muirate of potash were applied commonly to all the treatments as per the recommended dose of fertilizer. While, nitrogen was applied in three splits, 40% N at the time of sowing, 30% one month after sowing and 30% at pre-tasseling stage through urea. The gross plot area was covered by transparent mulch before sowing as per the treatments. Transparent polythene mulch used for mulching had 90 cm width, 15 micron thickness and 100 per cent elasticity. The wholes of 2.5 cm diameter were made in the polythene mulch as per the spacing i.e. 60 x 30 cm and then it was spread over the plots. Panchagavya is a bio-stimulant consisting of a combination of five products obtained from cow, which includes dung, urine, milk, curd and ghee. Three per cent solution and it is sprayed on the crop @ 500 liters ha^{-1} in all four sprays at 15 days of interval was taken when the crop was 15 days old.

Results and Discussions

Number of cobs, cob yield (q ha^{-1}), green fodder and total biological yield (q ha^{-1})

Effect of nutrient sources

The data regarding number cobs ha^{-1}, cob yield, green fodder and total biological yield as affected by the different treatments during both the years of experimentation and in the mean of two years are presented in Table 2. During both the years and in the mean of two years, the number of cobs per hectare was significantly higher with F_2 (i.e. 75% RDN + 25% N as PM) which was at par with F_3 (i.e. 50% RDN + 50% N as PM) and both these treatments were significantly superior over F_1 and F_4 treatments than other treatments. Whereas, F_1 recorded significantly higher number of cobs ha^{-1} over F_4 during both the years and in the mean of two years. Further, in respect of cob yield and total biological yield during all the three observations and green fodder yield during second year as compared to first year and in the mean of two years F_2 (75% RDN + 25% N as PM) level of nutrient source was significantly superior over the remaining levels. It was followed by F_1 (100% RDN) and F_3 (50% RDN + 50% N as PM) levels which were at par and significantly superior over F_4 (100% N as PM) in respect of the above referred characters. However, in case of green fodder yield during 2005-06 F_2 (75% RDN + 25% N as PM) and F_1 (100% RDN) levels were at par and were significantly superior over F_3 (50% RDN + 50% N as PM) and F_4 (100% N as PM) levels. These results are in close confirmation with those obtained by Khadtare *et al.* (2006) [3] and Muhammad *et al.* (2012) [5].

Effect of Polythene Mulch

With the significant improvement in the growth characters and yield attributes under the polythene mulch than no mulch, the number of cobs, green cob yield, fodder yield and total biomass yield were also influenced significantly due to polythene mulch than no mulch treatment. These results are comparable with those reported by Gosavi (2006) [2], Burhan Kara and Bekir Atar (2013) [1].

Effect of growth stimulants

The number of cobs, cob yield (q), green fodder and total biological yield (q ha^{-1}) were significantly higher with the application of 3% panchagavya spray + amrutpani through irrigation (P_1) than control (P_0) during all the three observations. Similar results are in close confirmation with Yadav and Christopher (2006) [9]; Tharmaraj *et al.* (2011) [8].

Economics

The parameters for economic analysis of sweet corn (Table 3) viz. cost of cultivation, gross returns, net returns and benefit : cost ratio were calculated on the basis of the mean number of cobs per hectare during both the years and the mean values. From the economics of treatments (Table 3) it is clearly evident that application of 50% RDN + 50% N as PM required significantly higher cost (Rs. 66660.14 ha^{-1}) than F_2 (Rs. 64274.88 ha^{-1}), F_4 (Rs. 64002.79 ha^{-1}) and F_1 (Rs. 59137.75 ha^{-1}), was mainly due to application of 50% nitrogen and full dose of phosphorus through chemical of fertilizer along with 50% nitrogen through poultry manure in comparison with other nutrient sources. The gross returns and net returns were significantly higher under F_2 (75% RDN + 25% N as PM) than rest of the nutrient sources. This may be due to better availability of nutrients resulted in creation of higher amount of sink. However, the B: C ratio was significantly higher under F_1 (RDN) than the remaining nutrient sources. This might be due to the application of nutrients through other nutrient sources required higher cost of application and the cost of poultry manure. These results are in close confirmation with Khadtare *et al.* (2006) [3].

Effect of polythene mulch

In case of economics (Table 3), it was observed that the cost of cultivation, gross return and net returns and B: C ratio were higher under polythene mulch than no mulch. This might be due to increased efficiency and yield of the crop under transparent polythene (7 micron). Though the cost of polythene mulch was higher the yield, gross and net returns obtained under polythene mulch were much more higher than the cost involved, which is also evident from the higher B: C ratio (Table 4) under polythene mulch than no mulch. Same result obtained by Gosavi (2006) [2].

Effect of growth stimulants

The cost of cultivation, gross returns and net returns were higher with the growth stimulants (P_1) over control (P_0) during both the years. Further, the B: C ratio was higher with the control (P_0) over growth stimulants (P_1) during both the years, this was due to higher cost of ingredients involved in the preparation of panchagavya and amrutpani. Further, the beneficial effect of the growth stimulants (P_1) resulted in to better growth and yield. The yield due to the growth stimulants (P_1) was much higher than the cost involved in

preparation and application of the growth stimulants (P_1). Therefore, the gross and net returns as well as B: C ratio was higher under the growth stimulants (P_1) than the control (P_0). Similar results were reported by Swaminathan *et al.* (2007) reported that application of panchagavya at 3% as foliar spray on black gram under irrigated condition recorded the highest net return and B:C ratio.

Table 2: Effect of nutrient sources, polythene mulch and growth stimulants on number of cobs, green fodder and total biological yield of the sweet corn

Treatments	Number of cobs per ha.			Cob yield (q/ha)			Green fodder yield (q/ha)			Biological yield (q/ha)		
	1st year	2nd year	Mean of 2 years	1st year	2nd year	Mean of 2 years	1st year	2nd year	Mean of 2 years	1st year	2nd year	Mean of 2 years
Nutrient sources												
F_1-100% RDN	48544.97	58531.75	53538.36	199.34	217.26	208.30	226.36	243.06	234.71	425.69	460.32	443.01
F_2-75% RDN + 25% N as PM	52447.09	62962.96	57705.03	214.62	230.82	222.72	238.10	256.61	247.35	452.71	487.43	470.07
F_3-50% RDN + 50% N as PM	51521.16	61044.97	56283.07	197.69	216.27	206.98	210.02	240.08	225.05	407.71	456.35	432.03
F_4-100% N as PM	41071.43	43716.93	42394.18	104.63	96.23	100.43	144.35	161.71	153.03	248.97	257.94	253.46
SE (m) ±	420.86	662.5917	418.98	2.75	2.29	2.32	4.22	2.11	3.10	6.62	4.22	5.36
CD (5%)	1456.42	2292.952	1449.91	9.51	7.92	8.04	14.61	7.30	10.74	22.91	14.62	18.56
Polythene mulch												
M_0-Control	45304.23	52347.88	48826.06	158.27	176.59	167.43	187.68	213.62	200.65	345.95	390.21	368.08
M_1-Mulch	51488.10	60780.42	56134.26	199.87	203.70	201.79	221.73	237.10	229.41	421.59	440.81	431.20
SE (m) ±	188.52	340.6312	209.85	0.60	0.65	0.46	0.78	0.66	0.46	0.95	1.13	0.79
CD (5%)	614.80	1110.858	684.37	1.97	2.11	1.50	2.53	2.14	1.51	3.10	3.69	2.58
Growth stimulants												
P_0-Control	47156.08	54662.70	50909.39	170.87	184.85	177.86	196.86	217.26	207.06	367.72	402.12	384.92
P_1-Panch. + Amrutpani	49636.24	58465.61	54050.93	187.27	195.44	191.35	212.55	233.47	223.01	399.82	428.90	414.36
SE (m) ±	134.19	179.00	113.45	0.38	0.42	0.33	0.43	0.50	0.29	0.58	0.75	0.49
CD (5%)	402.33	536.67	340.15	1.13	1.27	0.99	1.30	1.51	0.88	1.73	2.25	1.46
Interactions												
F X M	NS	NS	NS	NS	SIG	SIG	NS	NS	NS	NS	NS	NS
F X P	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
M X P	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
F X M X P	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
GM	48396.2	56564.15	52480.16	179.07	190.15	184.61	204.70	225.36	215.03	383.77	415.51	399.64

Table 3: Effect of nutrient sources, polythene mulch and growth stimulants on the economics of sweet corn production.

Treatments	Cost of Cultivation (Rs ha^{-1})			Gross Returns (Rs ha^{-1})			Net Returns (Rs ha^{-1})			B : C Ratio		
	1st year	2nd year	Mean of 2 years	1st year	2nd year	Mean of 2 years	1st year	2nd year	Mean of 2 years	1st year	2nd year	Mean of 2 years
Nutrient sources												
F_1-100% RDN	59137.75	66241.21	62689.48	143998.02	170634.92	157316.47	84860.27	104393.71	94626.99	2.44	2.57	2.51
F_2-75% RDN + 25% N as PM	64274.88	71880.44	68077.66	154927.25	183068.78	168998.02	90652.37	111188.34	100920.4	2.41	2.55	2.48
F_3-50% RDN + 50% N as PM	66660.14	74290.22	70475.18	149804.89	176620.37	163212.63	83144.75	102330.15	92737.45	2.25	2.37	2.31
F_4-100% N as PM	64002.79	66890.69	65446.74	96577.38	103604.50	100090.94	32574.59	36713.81	34644.2	1.51	1.55	1.53
Polythene mulch												
M_0-Control	57876.47	63896.02	60886.24	127101.52	146527.78	136814.65	69225.05	82631.76	75928.41	2.20	2.29	2.25
M_1- Mulch	69161.31	75755.27	72458.29	145552.25	170436.51	157994.38	76390.94	94681.24	85536.09	2.11	2.23	2.17
Growth stimulants												
P_0-Control	60694.05	66626.39	63660.22	132483.47	153323.41	142903.44	71789.41	86697.02	79243.22	2.19	2.29	2.24
P_1-Panchagavya + Amrutpani	66343.72	73024.89	69684.31	140170.30	163640.87	151905.59	73826.58	90615.98	82221.28	2.12	2.23	2.17

Treatment F_1, F_2, F_3 cob rate @ Rs. 2.50 cob^{-1} and for F_4 treatment @ Rs. 2.00 cob^{-1} and straw @ Rs. 1.00 kg^{-1} for all the treatments

Conclusion

It can be concluded that the integrated use of 75% nitrogen through urea and 25% N through poultry manure under polythene mulch and growth stimulants much better for getting higher productivity and economically feasible as compare to other nutrient management practices. However, the B: C ratio was significantly higher under 100% RDN and control than rest of the nutrient sources and no mulch and without growth stimulants which will be beneficial without loss of cost.

References

1. Burhan K, Bekir A. Effects of mulch practices on fresh ear yield and yield components of sweet corn. Turkish Journal of Agriculture and Forestry. 2013; 37:281-287.
2. Gosavi SP. Effect of mulches, fertilizer and levels of organicmanure on the performance of *rabi* sweet corn (*Zea mays saccharata*). Thesis submitted for M.Sc. (Agri.) to Dr. BSKKV, Dapoli, Dist. Ratnagiri, Maharashtra, 2006.
3. Khadtare SV, Patel MV, Jadhav JD, Mokashi DD. Effect of vermicompost on yield and economics of sweet corn. Journal of Soil and Crops. 2006b; 16:401-406.
4. Mahale AM, Satpute GN, Mahurkar DG, Bhadane RS, Dusane SM. Effect of polythene mulch on morphological parameter and yield of groundnut (*Arachis hypogaea* L.). Indian Journal of Agronomy. 2002; 41:178-182.
5. Muhammad Sarwar, Jilani G, Rafique E, Muhammad EA, Chaudhry AN. Impact of Integrated Nutrient Management on Yield and Nutrient Uptake by Maize under Rain-Fed Conditions. Pakistan Journal of Nutrition. 2012; 11:27-33.
6. Narayanswami MR, Veerabhadran V, Jayanthi C, Chinuswami C. Plant density and nutrient management for rain-fed maize in red soils. Madras Agricultural Journal. 1994, 5:81.
7. Tang QL, Xu JY. Mulching cultivation increasing spring groundnut yield. Zheijiang Agricultural Sciences, 1986; 2:65-67.

8. Tharmaraj K, Ganesh P, Suresh Kumar R, Anandan A, Kolanjinathan K. A Critical Review on Panchagavya–A Boon Plant Growth. International Journal of Pharmaceutical & Biological Archives. 2011; 2:1611-1614.
9. Yadav BK, Louduraj AC. Effect of organic manures and panchagavya spray on rice (*Oryza sativa* L.) quality. Crop Research. 2006; 31:6-10.