ISSN : 1812-5379 (Print)
ISSN : 1812-5417 (Online)
http://ansijournals.com/ja

JOURNAL OF AGRONOMY

ANSInet
Asian Network for Scientific Information
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

Journal of Agronomy 12 (2): 109-112, 2013
ISSN 1812-5379 / DOI: 10.3923/ja.2013.109.112

Effect of Foliar Spray of Panchagavya on Yield Attributes, Yield and Economics of Babycorn

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Abstract: Babycorn is a finger like corn which is harvested before pollination or two to three days after silk emergence. The effect of inorganic fertilizer in combination with panchagavya information is limited in babycorn and needs field investigation. Hence, the field experiments were conducted at Faculty of Agriculture, Annamalai University, Chidambaram during, July-September, 2008 and January-March, 2009 to study the effect of foliar spray of panchagavya on the growth and yield of babycorn cv. CoBC 1. The experiments were laid out in Randomized Block Design with fourteen treatments replicated thrice. The treatments included different levels of nutrients and foliar application of panchagavya (3 and 4%) at various stages of babycorn. The results revealed that four sprays of three percent panchagavya at 15, 25, 35 and 45 Days After Sowing (DAS) along with 100% Recommended Dose of Fertilizers (RDF) recorded the highest fresh babycorn yield (7439 and 7476 kg ha^{-1}, in 2008 and 2009, respectively) followed by 3 sprays of 3% panchagavya along with 100% recommended dose of fertilizers (7226 kg ha^{-1} 2008 and 7262 kg ha^{-1} in 2009).

Key words: Babycorn, economics, foliar spray, panchagavya, yield and yield attributes

INTRODUCTION

Babycorn (*Zea mays*) refers to the young, fresh corn ear just before or within two to three days after silking but prior to pollination and fertilization, which upon dehusking and desilking is used as vegetable. Babycorn ears, light yellow in colour with regular row arrangement, 10-12 cm long and a diameter of 1.0-1.5 cm are preferred in the market. It is a highly nutritive crop. For every 100 g of edible portion, it contains 88.10% moisture, 8.20 g carbohydrates, 1.90 g protein, 0.20 g fat, 28.00 mg calcium, 86.00 mg phosphorus, 0.10 mg iron, 0.50 mg thiamine, 0.08 mg riboflavin and 11.00 mg of ascorbic acid. Application of inorganic nutrients like nitrogen, phosphorus and potassium are the key nutrients which greatly influence the yield of crops. In addition, integration of organic with inorganic fertilizers improves the physiological system of the crop, provides adequate growth regulating substances and modifies soil physico-chemical behaviour and results in augmented crop yields. Foliar fertilization is a simple and effective method of providing nutrients to crops (Alexander and Schroeder, 1987). Foliar application will be more efficient than soil application at the late growth stage when there is preferential assimilates translocation into seeds/fruits and root activity for nutrient uptake is limited. At the late growth stage, the quality of fodder (or) human food products can be specifically improved by foliar fertilization. The current global scenario unwaveringly underlines the demand to take up eco-friendly cultivation practices for sustainable food production. The monetary value of inorganic fertilizers is heightening hugely to the degree, so that they are not affordable for small and marginal farmers.

Panchagavya is an organic formulation made from cow goods. The usage of fermented organic formulations with supportive beneficial microorganisms as foliar nourishment has been come into the picture of modern agriculture for giving rise to good quality non residue protected food (Galindo *et al*., 2007). Consequences of panchagavya application are superior growth, yield and quality of crops. This liquid organic solution is prepared from cow dung, urine, milk, curd, ghee, legume flour and jaggary. It provides macro nutrients, essential micro nutrients, many vitamins, required amino acids, growth promoting substances and beneficial microorganisms for plants well growth. Organic farmers of Tamil Nadu are preparing this foliar nutriment as a home-grown product and it is used widely for field and vegetable crops. Keeping these in view, field investigations were carried out to study the effect of foliar spray of panchagavya on the growth and yield of babycorn.

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MATERIALS AND METHODS

Field location and soil status: The field experiments were conducted during July-September (2008) and January-March (2009) to study the effect of foliar spray of panchagavya on the growth, yield and economics of Babycorn at Department of Agronomy, Faculty of Agriculture, Annamalai University (11°24'N, 79°44'E and +5.79 above MSL) with the variety COBC 1. The soil of the experimental fields were clay loam and the soil fertility status was high in available nitrogen (258.5, 253.5 kg ha^{-1}), medium in available phosphorus (17.3, 16.8 kg ha^{-1}) and high in available potassium (278.2, 282.3 kg ha^{-1}). The organic carbon content was from 0.34-0.38%.

Treatments details: The experiments were laid out in a Randomized Block Design with fourteen treatments and three replications. The treatments included in the study were, T_1-100% recommended dose of fertilizers (RDF-150:60:40 kg NPK ha^{-1}), T_2-100% RDF+3 sprays of 3% panchagavya at 15, 25, 35 Days After Sowing (DAS), 100% RDF+3 sprays of 4% panchagavya at 15, 25, 35 DAS (T_3), 100% RDF+4 sprays of 3% panchagavya at 15,25,35,45 DAS (T_4), 100% RDF+4 sprays of 4% panchagavya at 15,25,35,45 DAS (T_5), 3 sprays of 3% panchagavya at 15, 25, 35 DAS alone (T_6), 4 sprays of 3% panchagavya at 15, 25, 35, 45 DAS alone (T_7), 3 sprays of 4% panchagavya at 15, 25, 35 DAS alone (T_8), 4 sprays of 4% panchagavya at 15,25,35,45 DAS alone (T_9), 75% RDF+3 sprays of 3% panchagavya at 15, 25, 35 DAS (T_{10}), 75% RDF+ 3 sprays of 4% panchagavya at 15, 25, 35 DAS (T_{11}), 75% RDF+4 sprays of 3% Panchagavya at 15, 25, 35, 45 DAS (T_{12}), 75% RDF+4 sprays of 4% panchagavya at 15,25,35,45 DAS (T_{13}), RDF+seed treatment with panchagavya (3 mL kg^{-1}) (T_{14}). Panchagavya was prepared by using the following ingredients obtained from the cow. cow dung (5 kg), cow's urine (3 L), cow's milk (2 L), cow's curd (2 L), cow's ghee (1 L), sugarcane juice (3 L), tender coconut water (3 L) and riped banana (1 kg). Cow dung was mixed with all other ingredients at once in the plastic container having a capacity of 20 L. Riped bananas were added to facilitate quick fermentation. All the materials were put into a wide mouthed mud pot and kept open under shade. The contents were stirred for about 20 min, both in the morning and evening to facilitate aerobic microbial growth, aeration and to increase the storability period upto two months. After 10 days, the panchagavya stock solution was ready for use. From the stock solution 3 percent concentration was prepared according to the requirement (To get 3% concentration, 3 L of panchagavya was mixed with 100 L of water). The spray solution @ 500 L ha^{-1} was applied using hand sprayer with high pore size. The seeds of Babycorn were obtained from Millet Breeding Station, Tamil Nadu Agricultural University, Coimbatore and used for both the seasons. Observations on yield parameters were taken and presented. Economics was worked out based on the current price of inputs.

Statistical analysis: All the data of observations recorded in the experiments were statistically analysed as suggested by Panse and Sukhatame (1978). The critical differences were worked out at 5% probability level.

RESULTS AND DISCUSSION

Yield attributes: The yield components *viz*., number of cobs $plant^{-1}$, cob length and cob girth were significantly influenced by recommended dose of fertilizers and Panchagavya foliar spray. Application of recommended dose of fertilizers and Panchagavya foliar spray at different stages of the crop led to better photosynthetic activity of the plant and more extensive root system and thus, enabled the plant to extract nutrient from the soil thereby resulting in better development of yield components. The least yield components recorded under panchagavya spray 3 times alone @ 4% concentration without recommended dose of fertilizers might be due to inadequate supply of nutrients to plant which inturn affecting the yield components of the crop. The baby corn with maximum cob length (25.40, 26.66 cm), cob width (4.44, 4.46 cm) and individual cob weight (28.02, 26.69 g) were recorded under panchagavya spray 4 times @ 3% concentration (T_4). The efficacy of RDF was already proved and hence it is being recommended (CPG, 1999). Maximum cob size was observed in panchagavya spray 4 times @ 3% concentration with RDF. Similar increment in yield parameters was observed by Sathiyamoorthi (1997) in greengram.

Yield: There existed significant difference in the yield of babycorn due to various treatments. The highest yield of babycorn was observed in the RDF+4 sprays of 3% panchagavya at 15, 25, 35 and 45 DAS (7439 and 7476 kg ha^{-1}) in both the years (Table 1). This might be due to adequate supply of nutrients at different growth stages of the crop as well as presence of growth regulators in panchagavya contributing to higher cob yield. Thind *et al*. (2001) stated that availability of photo assimilates during longer grain filling period of maize combined with more leaf area at flowering stage might have accounted for yield increase under biogas slurry+panchagavya. Abundant supply of nutrients through recommended dose of fertilizers+3% panchagavya sprays on 15, 25, 35 and 45 DAS might have increased the protoplasmic constituents and accelerate

Table 1: Effect of foliar spray of panchagavya on yield attributes and yield of babycorn

Treatments	No. of Cobs/plant		Cob length (cm)		Cob width (cm)		Individual cob weight (g)		Yield (kg ha^{-1})	
	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009
T_1. Recommended dose of fertilizers (RDF)	1.89	1.98	18.26	19.16	3.54	3.55	22.14	23.47	6585	6618
T_2-RDF+3 sprays of 3% Panchagavya at 15, 25, 35 DAS	2.62	2.75	24.61	25.83	4.30	4.32	27.36	28.99	7344	7381
T_3-RDF+3 sprays of 4% Panchagavya at 15, 25, 35 DAS	2.43	2.54	22.82	23.96	4.11	4.13	26.05	27.61	7226	7262
T_4-RDF+4 sprays of 3% Panchagavya at 15,25,35,45 DAS	2.81	2.95	25.40	26.66	4.44	4.46	28.02	29.69	7439	7476
T_5-RDF+4 spray of 4% Panchagavya at 15,25,35,45 DAS	2.60	2.72	24.40	25.62	4.26	4.28	27.08	28.70	7318	7354
T_6-3 sprays of 3%Panchagavya at 15, 25, 35 DAS alone	1.71	1.79	16.67	17.50	3.34	3.35	20.84	22.09	6395	6427
T_7-4 sprays of 3% Panchagavya at 15, 25, 35, 45 DAS alone	1.80	1.89	17.47	18.34	3.43	3.44	21.49	22.77	6490	6523
T_8-3 spray of 4% Panchagavya at 15, 25, 35 DAS alone	1.58	1.65	15.86	16.64	3.20	3.21	19.95	21.14	6238	6269
T_9-4 sprays of 4% Panchagavya at 15,25,35,45 DAS alone	1.60	1.67	15.93	16.72	3.24	3.25	20.18	21.39	6264	6295
T_{10}-75% RDF+3 sprays of 3% Panchagavyaat 15, 25, 35 DAS	2.25	2.36	21.43	22.50	3.92	3.93	24.75	26.23	6964	6999
T_{11}-75% RDF+3 sprays of 4% Panchagavya at 15, 25, 35 DAS	2.07	2.17	19.85	20.84	3.73	3.75	23.45	24.85	6775	6808
T_{12}-75% RDF+4 sprays of 3% Panchagavya at 15, 25, 35, 45 DAS	2.40	2.52	22.61	23.74	4.05	4.07	25.81	27.36	7200	7236
T_{13}-75% RDF+4 sprays of 4% Panchagavya at 15,25,35,45 DAS	2.16	2.26	20.63	21.66	3.82	3.83	24.10	25.54	6869	6904
T_{14}-RDF+seed treatment (3 mL Panchagavya/kg)	1.98	2.07	19.05	20.00	3.72	3.66	22.79	24.16	6680	6713
SEd	0.18	0.20	1.19	1.51	0.04	0.04	1.14	1.15	418	421
CD (p = 0.05)	0.37	0.41	3.32	3.42	0.09	0.10	2.78	3.01	861	865

Table 2: Effect of foliar spray of panchagavya on economics of babycorn

Treatments	Gross Income (ha^{-1})		Net Income (ha^{-1})		B:C	
	2008	2009	2008	2009	2008	2009
T_1. Recommended dose of fertilizers (RDF)	52766	53035	28545	28650	2.18	2.17
T_2-RDF+3 sprays of 3% Panchagavya at 15, 25, 35 DAS	62197	62532	35727	35851	2.35	2.34
T_3-RDF+3 sprays of 4% Panchagavya at 15, 25, 35 DAS	59940	60259	33585	33704	2.27	2.27
T_4-RDF+4 sprays of 3% Panchagavya at 15,25,35,45 DAS	79732	80190	54122	54281	3.11	3.10
T_5-RDF+4 spray of 4% Panchagavya at 15,25,35,45 DAS	60660	60984	34300	34421	2.30	2.29
T_6-3 sprays of 3% Panchagavya at 15, 25, 35 DAS alone	49688	49935	26588	26687	2.15	2.14
T_7-4 sprays of 3% Panchagavya at 15, 25, 35, 45 DAS alone	53454	53728	28808	28914	2.16	2.16
T_8-3 spray of 4% Panchagavya at 15, 25, 35 DAS alone	51223	51481	27077	27179	2.12	2.11
T_9-4 sprays of 4% Panchagavya at 15,25,35,45 DAS alone	49144	49388	26122	26220	2.13	2.13
T_{10}-75% RDF+3 sprays of 3% Panchagavya at 15, 25, 35 DAS	57660	57963	32050	32165	2.25	2.24
T_{11}-75% RDF+3 sprays of 4% Panchagavya at 15, 25, 35 DAS	56532	56827	31312	31425	2.24	2.23
T_{12}-75% RDF+4 sprays of 3% Panchagavya at 15, 25, 35, 45 DAS	59196	59510	33156	33274	2.27	2.26
T_{13}-75% RDF+4 sprays of 4% Panchagavya at 15,25,35,45 DAS	57152	57452	31717	31831	2.24	2.24
T_{14}-RDF+seed treatment (3 mL Panchagavya/kg)	54997	55281	30176	30285	2.21	2.21

the process of cell division and elongation. This in turn resulted in increased babycorn yield. Similar results were reported by Auti *et al.* (1999) and Somasundaram (2003) in maize. The least babycorn yield recorded under panchagavya spray 3 times alone might be due to lack of adequate supply of phosphorus and nitrogen to the crop which inturn affected the growth and yield components of the crop ultimately reflecting on yield. The present results are in agreement with the earlier findings of Pandian *et al.* (2001) in greengram. In accordance with present observations on panchagavya spray, remarkable positive influence on growth and yield attributes were observed in maize by Somasundaram *et al.* (2003) and Kumar *et al.* (2011). Natarajan (2002) reported increased yield of crop plants with panchagavya application due to enhancement in the biological efficiency of crop plants.

ECONOMICS

Among the different indicators of monetory efficacy in any production system, economics in terms of net return and B:C ratio has a greater impact on the practical utility and acceptance of the technology (Table 2). Significantly higher net return and B:C ratio were recorded

with the application of RDF+4 sprays of 3% panchagavya compared to RDF and all other treatments. This could be mainly attributed to the higher yield. Higher net return (Rs.79732, 80190) and B:C ratio (3.11, 3.10) was recorded with the application of recommended dose of fertilizers along with 4 sprays of three percent panchagavya at 15, 25, 35 and 45 DAS. Similar results were reported by Somasundaram (2003) in maize.

CONCLUSION

The results of the present study, indicated that application of entire dose of recommended (150:60:40 kg NPK ha^{-1}) fertilizers (100%) with four sprays of three percent panchagavya at 15, 25, 35 and 45 days after sowing recorded higher yield attributes, yield and economics of babycorn cv. COBC 1.

ACKNOWLEDGMENT

The first author acknowledges Tamil Nadu State Council for Science and Technology (TNSCST) for providing fellowship during M.Sc. (Agri) Agronomy degree programme.

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