The Andhra Agric. J 72 (3): 269-273, 2025
doi :10.61657/aaj.2025.207

Nutrient uptake and quality parameters of sweet corn as influenced by liquid organic manures

M Sushmitha, B Rajendra Kumar, P Amara Jyothi, P Gurumurthy, A Upendra Rao and S Govinda Rao

Department of Agronomy, Acharya N G Ranga Agricultural University,
Agricultural College, Naira, Andhra Pradesh, India

ABSTRACT

A field experiment entitled "Effect of liquid organic manures on the performance of sweet corn" was conducted during *rabi*, 2022-23 at Agricultural College farm, Naira to evaluate the performance of different liquid organic manures at various nutrient levels. The experiment was laid out in split-plot design in which different fertilizer levels are taken in main plots and different liquid organic manures are taken on subplots to assess the performance of sweet corn. Among the treatments, higher uptake of nutrients in both the kernel and stover was recorded with 100% RDF+ FYM @ 10 t ha^{-1} which was on par with 75% RDF+ FYM @ 10 t ha^{-1} and among the liquid organic manures highest uptake was recorded with application of liquid azospirillum+PSB+KRB +ZnSB@ 1.25 L ha^{-1}. Significantly higher values of quality parameters were recorded with application of 100% RDF+ FYM @ 10 t ha^{-1} and among the liquid organic manures application of liquid azospirillum+PSB+KRB +ZnSB@ 1.25 L ha^{-1} recorded higher values which was on par with Panchagavya spraying @ 3%. There was no interaction between fertilizer levels and liquid manures for the parameters studied.

Keywords: *Liquid organic manures,Panchagavya, Phosphate solubilizing bacteria, Potassium releas ing bacteria, Azosiprillum.*

Maize is one of the most important crop especially in cereal crops and is third most among the major crops grown and consumed as food by millions of people, especially in the developing countries. It is called as "queen of cereals" and it contributes more than 20 percent of the world's total cereal production. It is one off the most versatile crops grown in nature, which can grow among different climatic conditions, variety of soils and can grow in all seasons. It has acquired a dominant position in farming sector all over the world and in India. About 85 per cent of maize produced in the country is consumed directly as food in various forms such as chapattis, roasted ears, popcorn, cornflakes, *etc*. Maize possesses tremendous potential in terms of feed for dairy, poultry and piggery. In addition to this, it is also used in production of flour, starch, carbohydrates, glucose, liquid glucose, maltose, ethanol, corn oil, ayurvedic medicines, making soups, corn syrups, vegetable salad, bioenergy production *etc*., and also provides good quality fodder for animals, throughout the year. In India, maize is cultivated across a vast area, with the total area sown being approximately 108.87 lakh hectares during the 2023-24 season and in Andhra Pradesh it is grown in 2.91 lakh hectares and is estimated to produce 19.04 lakh tonnes with an average productivity of 6543 kg ha^{-1} (Maize outlook report, 2023-2024). In India maize was grown in 11.24 million hectares, yielding about 37.67 million tonnes of grain with a productivity of 3351 kg ha^{-1} (Directorate of Economics and Statistics, 2023-24). Among the maize types, Sweet corn (*Zea mays var. saccharata*) is an important type of specialty corn cultivated across the globe as well in India, specially bred to increase sugar content and also known as "Sugar corn". The nutritional values of sweet corn make it a better component for culinary purposes and the human diet (Swapna *et al*., 2020). It also has health benefits as it contains carotenoids such as xanthophyllous, lutein and zeaxanthin which improve the health of the eyes (Ozata, 2019). It is necessary to develop improved nutrient management practices in order to improve crop growth causing less harm to the environment (Manoj *et al*., 2020; Krasilnikov *et*

al., 2022). Sweet corn being an exhaustive crop it's very difficult to supply entire nutrients organically to produce a profitable crop hence, combination of inorganic fertilizers and organic sources of nutrients might be helpful.

MATERIAL AND METHODS

The present field investigation entitled "Effect of liquid organic manures on the performance of sweet corn" was conducted during *rabi*, 2022-23 at the Agricultural College Farm, Naira, Andhra Pradesh, which is geographically situated at 18.24^0 N latitude, 83.84^0 E longitudes and with an altitude of 27 m above mean sea level in the North Coastal Zone of Andhra Pradesh. The weekly weekly mean maximum temperature ranged from 29.7 ^{0}C to 34.7 ^{0}C during the crop growth period with an average of 32.1 ^{0}C. The weekly mean minimum temperature varied from 15.9 ^{0}C minimum to 26.1 ^{0}C maximum, with an average of 20.1 ^{0}C. During the corresponding period mean relative humidity ranged from 60.1 to 82.6 per cent with an average of 71.3 per cent. A total rainfall of 422.9 mm was received during the crop growth period. The soils are sandy loam in texture, have pH soil reaction of 7.4, EC (0.052 dSm^{-1} at 25 ^{o}C) and organic carbon of 0.054 %, low in available nitrogen (226.4 kg ha^{-1}), medium in available phosphorus (17.3 kg ha^{-1}) and medium available potassium (238.1 kg ha^{-1}). The experiment was laid out in Split-plot design with three main plots *viz.,* M_1-100% RDF (180-60-60 NPK kg ha^{-1}) + FYM @ 10 t ha^{-1}; M_2-75% RDF (135-45-45 NPK kg ha^{-1}) + FYM @ 10 t ha^{-1} and M_3-0% RDF(Control) and 4 Sub Plots *viz.,* S_1- liquid Azospirllum+PSB+KRB+ZnSB @ 1.25 l ha^{-1} each at knee high stage; S_2- Vermiwash spraying twice @ 5% at knee high and tasseling to silking stages; S_3- Panchagavya spraying twice @ 3% at knee high and tasseling to silking stages and S_4- Drava Jeevamrutham spraying twice @ 10% at knee high and tasseling to silking stages. The nutrients are supplied as per the treatments requirement and the liquid organic manures were given by spraying as per

Table 1. Nitrogen, phosphorus and potassium uptake (kg ha^{-1}) in kernel and stover as influenced by different doses of RDF and liquid organic manures

Treatments	Nitrogen		Phosphorus		Potassium	
	(Kernel)	(Stover)	(Kernel)	(Stover)	(Kernel)	(Stover)
Fertilizer levels (RDF-180-60-60 kg ha^{-1})						
M_1 - 100% RDF (180-60-60 NPK kg ha^{-1}) + FYM @ 10 t ha^{-1}	90.4	307.1	32.24	86.71	121.28	210.5
M_2 - 75% RDF (135-45-45 NPK kg ha^{-1}) + FYM @ 10 t ha^{-1}	63.89	251.42	20.89	72.22	78.33	174.31
M_3 - 0% RDF- Control	47.44	112.91	13.53	41.88	50.75	75.61
SEm (±)	1.5	9.17	0.55	2.85	2.06	6.3
CD (p=0.05)	5.92	36	2.16	11.2	8.11	24.7
CV (%)	7.76	14.2	8.57	14.81	8.57	14.2
Four liquid organic manures						
S_1 - Liquid azospirillum+PSB+KRB+ZnSB@ 1.25 L ha^{-1} each at knee high stage	84.35	267.42	28.73	76.34	107.75	184.28
S_2 - Vermiwash spraying twice @ 5% at knee high and tasseling to silking stages	44.36	191.97	13.99	59.01	52.47	131.76
S_3 - Panchagavya spraying twice @ 3% at knee high and tasseling to silking stages	75.95	228.72	25.13	68.15	94.25	154.18
S_4: Drava Jeevamrutham spraying twice @ 10% at knee high and tasseling to silking stages	64.31	207.06	21.16	64.23	79.35	143.72
SEm (±)	1.88	8.72	0.58	2.28	2.2	6
CD (p=0.05)	5.61	25.91	1.74	6.8	6.54	17.81
CV (%)	8.42	11.7	7.91	10.21	7.91	11.7
Interaction						
CD (p=0.05)	NS	NS	NS		NS	NS

requirement. Quality parameters like kernal protein content (%), total sugar content (%) and total soluble solids were analysed after the harvest. Whereas, nutrient uptake in both cob and stover were analysed at harvest by following standard laboratory protocol. Data was analyzed statistically by following standard procedures as suggested by Panse and Sukhatme (1978).

RESULTS AND DISCUSSION

The perusal of data on nitrogen uptake by sweetcorn crop was significantly influenced fertilizer levels and liquid organic manures treatments. at harvest with kernel and stover separately. The nitrogen uptake among fertilizer levels was recorded highest with 100% RDF+ FYM @ 10 t ha^{-1} in both the kernel and stover (90.40 and 307.10 kg ha^{-1} respectively) followed by 75% RDF (135-45-45 NPK kg ha^{-1}) (63.89 and 251.42 kg ha^{-1} respectively) and lowest nitrogen uptake in kernel and stover was recorded in control (47.44 and 112.91 kg ha^{-1} respectively). Among the liquid organic manures, the highest uptake in kernel and stover was recorded in liquid Azospirillum+PSB+KRB+ZnSB@ 1.25 l ha^{-1} (84.35 and 267.42 kg ha^{-1} respectively) followed by Panchagavya spraying twice @ 3% at knee high and tasseling to silking stages (75.95 and 228.72 kg ha^{-1} respectively), Drava Jeevamrutham spraying twice @ 10% at knee high and tasseling to silking stages (64.31

Table 2. Kernel protein content (%), TSS (% Brix reading) and sugar content (%) as influenced by different doses of RDF and liquid organic manures

Treatments	Kernel protein content (%)	TSS (% Brix reading)	Sugar content
Fertilizer levels (RDF-180-60-60 kg ha^{-1})			
M_1: 100% RDF (180-60-60 NPK kg ha^{-1}) + FYM @ 10 t ha^{-1}	8.18	15.38	13.93
M_2: 75% RDF (135-45-45 NPK kg ha^{-1}) + FYM @ 10 t ha^{-1}	7.54	14.43	11.04
M_3: 0% RDF- Control	6.26	13.49	10.34
SEm ±	0.12	0.28	0.19
CD (P=0.05)	0.5	1.1	0.75
CV (%)	6.02	6.73	5.64
Four liquid organic manures			
S_1: Liquid azospirillum+PSB+KRB+ZnSB@ 1.25 L ha^{-1} each at knee high stage	7.91	15.22	12.5
S_2: Vermiwash spraying twice @ 5% at knee high and tasseling to silking stages	6.59	13.49	11.17
S_3: *Panchagavya* spraying twice @ 3% at knee high and tasseling to silking stages	7.71	14.95	11.9
S_4: Drava *Jeevamrutham* spraying twice @ 10% at knee high and tasseling to silking stages	7.1	14.07	11.5
SEm ±	0.15	0.26	0.26
CD (P=0.05)	0.45	0.78	0.77
CV (%)	6.32	5.45	6.68
Interaction			
CD (P=0.05)	NS	NS	NS

and 207.06 kg ha^{-1}, respectively) and the lowest uptake was recorded in Vermiwash spraying twice @ 5% at knee high and tasseling to silking stages (44.36 and 191.97 kg ha^{-1} respectively). Similar findings were reported by the Shah *et al*. (2017).

The phosphorous uptake in kernel and stover with fertilizer doses was obtained highest with 100% RDF+ FYM @ 10 t ha^{-1} (32.24 and 86.71 kg ha^{-1} respectively) followed by 75% RDF (135-45-45 NPK kg ha^{-1} (20.89 and 72.22 kg ha^{-1} respectively) and the lowest was recorded in control (13.53 and 41.88 kg ha^{-1} respectively). Among the various liquid organic manures, the highest uptake in kernel and stover was recorded with Liquid azospirillum+PSB+ KRB+ZnSB@ 1.25 L ha^{-1} each at knee high stage (28.73 and 76.34 kg ha^{-1} respectively) followed by Panchagavya spraying twice @ 3% at knee high and tasseling to silking stages(25.13 and 68.15 kg ha^{-1} respectively), Drava Jeevamrutham spraying twice @ 10% at knee high and tasseling to silking stages(21.16 and 64.23 kg ha^{-1} respectively) and the lowest uptake was recorded with Vermiwash spraying twice @ 5% at knee high and tasseling to silking stages (13.99 and 59.01 kg ha^{-1} respectively). These finding were in line with Immanuel *et al.* (2021).

The potassium uptake in both kernel and stover in fertilizer doses was recorded highest with application of 100% RDF+ FYM @ 10 t ha^{-1} (121.28 and 210.50 kg ha^{-1} respectively) followed by 75% RDF (135-45-45 NPK kg ha^{-1}) (78.33 and 174.31 kg ha^{-1} respectively) and the lowest uptake was recorded in control (50.75 and 75.61 kg ha^{-1} respectively). Among the liquid organic manures the highest uptake was recorded with Liquid azospirillum+PSB +KRB +ZnSB@ 1.25 l ha^{-1} each at knee high stage (107.75 and 184.28 kg ha^{-1} respectively) followed by Panchagavya spraying twice @ 3% at knee high and tasseling to silking stages (94.25 and 154.18 kg ha^{-1} respectively), Drava Jeevamrutham spraying twice @ 10% at knee high and tasseling to silking stages (79.35 and 143.72 kg ha^{-1}) and lowest was recorded in Vermiwash spraying twice @ 5% at knee high and tasseling to silking stages (52.47 and 131.76 kg ha^{-1} respectively). Similar findings were reported by Shahin *et al.* (2022).

Quality parameters

Among the fertilizer levels, 100% RDF+ FYM @ 10 t ha^{-1} recorded significantly higher kernel protein content (8.18%). However, the control recorded significantly lower kernel protein content (6.26 %) and it was significantly inferior to the rest of the treatments studied. Liquid organic manures have shown significant influence on kernel protein The treatment with application of Liquid Azospirillum+PSB+KRB+ZnSB@ 1.25 l ha^{-1} each at knee high stage recorded significantly higher kernel protein content (7.91 %) and it was statistically on par with application of Panchagavya spraying twice @ 3% at knee high and tasseling to silking stages (7.71 %). However, application of Vermiwash spraying twice @ 5% at knee high and tasseling to silking stages recorded significantly lower kernel protein content (6.59 %). Kumar *et al.* (2007), Suthar *et al.* (2012) and Ali *et al.* (2022) confirm this claim with evidence.

Data recorded on total soluble sugars (%) was presented and among the different fertilizer doses, the treatment with 100% RDF+ FYM @ 10 t ha^{-1} recorded a maximum total soluble sugar (15.38 %). However, the control recorded significantly lower total soluble sugars (13.49 %) and it was significantly inferior to the rest of the treatments studied. Liquid organic manures have shown significant influence on total soluble (%). The treatment with application of liquid azospirillum+PSB+KRB+ZnSB@ 1.25 l ha^{-1} each at knee high stage recorded significantly higher total soluble sugars (15.22 %) and it was statistically on par with application of Panchagavya spraying twice @ 3% at knee high and tasseling to silking stages (14.95 %). However, application of Vermiwash spraying twice @ 5% at knee high and tasseling to silking stages recorded significantly lowers kernel protein content (13.49 %). The results were supported by previous works reported by Capon *et al.* (2017) and Murmu *et al.* (2016).

Among the various fertilizer levels, the treatment with 100% RDF+ FYM @ 10 t ha^{-1} recorded a maximum sugar content (13.93 %). However, the control recorded significantly lower sugar content (10.34 %) and it was significantly inferior to the rest of the treatments studied 71 (%). Liquid organic manures have shown significant influence on sugar content and the treatment with application of liquid Azospirillum+PSB+KRB +ZnSB@ 1.25 L ha^{-1} each at knee high stage recorded significantly higher sugar content (12.50 %) and it was statistically on par with application of Panchagavya spraying twice

@ 3% at knee high and tasseling to silking stages (11.90 %). However, application of Vermiwash spraying twice @ 5% at knee high and tasseling to silking stages (S2) significantly lower sugar content (11.17 %).

CONCLUSION

From the experiment it can be concluded that application of 100% RDF+ FYM @ 10 t ha^{-1} has recorded significantly higher nutrient uptake in both kernel and stover which was on par with 75% RDF+ FYM @ 10 t ha^{-1} and among the liquid organic manures highest uptake was recorded with application of liquid Azospirillum+PSB+KRB +ZnSB@ 1.25 L ha^{-1}. Significantly higher values of quality parameters were recorded with application of 100% RDF+ FYM @ 10 t ha^{-1} and among the liquid organic manures application of liquid Azospirillum+PSB+KRB+ZnSB@ 1.25 L ha^{-1} has recorded higher quality parameters which was on par with Panchagavya spraying @3%.

LITERATURE CIRTED

Ali S, Sayfzadeh S, Abadi S A V, Shahsavari N and Zakerin H 2022. Quantitative and qualitative traits of sweet corn as influenced by delayed cropping, biofertilizers and nitrogen. *Journal of Plant Nutrition*. 12(1): 1-6.

Directorate of Economics and Statistics, 2023-2024. Agricultural Statistics at a Glance.

Capon D S, Nitural D S and Dela N E 2017. Nutrient use efficiency yield and fruit quality of sweet corn growth under different fertilizer schemes. International *Journal of Agricultural Technology*. 13(7.1): 1413-1435.

Immanuel R R, Rao G B S, Perumal S S, Arivukkarasu K and Mullaivendhan V 2021. Nutrient uptake and use efficiency of maize (Zea mays L.) As influenced by microbial seed inoculation, NPK fertilization and Panchagavya foliar application. *Plant Archives*. 21(1): 2041-2045.

Kumar M A, Galiand S K and Hebsur N S 2007. Effect of different level of NPK on growth and yield parameters of sweet corn. Karnataka Journal of Agricultural Science. 20(1): 41-43.

Krasilnikov P, Taboada M A and Amanullah 2022. Fertilizer use, soil health and agriculture sustainability. *Agriculture*. 12(4). 462.

Maize outlook report,23-2024. https://angrau.ac.in/downloads/AMIC/tlookReports

Manoj K N, Uma V and Kiran S C 2020. Significance of liquid organic manures in sustainable crop production. *International Journal of Ecology and Environmental sciences.* 2: 445-449.

Murmu K, Swain D K and Ghosh B C 2016. Effect of mineral and organic nutrient management on sweet corn production system in acid lateritic soil of India. *Journal of Earth Environment and Health Science*. 2: 70-76.

Ozata E 2019. Evaluation of fresh ear yield and quality performance in super sweet corn. *International Journal of Life Sciences Biotechnology and Pharma Research*. 2(2): 80-94.

Panse V G and Sukhatme P V 1978. Statistical methods for agricultural workers. Indian Council of Agricultural Research, New Delhi. 361.

Shah R A and Wani B A 2017. Yield, nutrient uptake and soil fertility of maize (Zea mays L.) as influenced by varying nutrient management practices under temperate conditions of Kashmir valley, India. *Plant Archives*. 17(1): 75-78.

Shahin S K, Rao M S, Rao U A, Gurumurthy P and Basu J B 2022. Effect of various nutrient management practices on yield attributes, quality parameters and economics of sweet corn. *The Andhra Agricultural Journal*. 69(1): 18-24.

Suthar M, Singh D and Nepalia V 2012. Green fodder and cob yield of sweet corn (*Zea mays. L. ssp. saccharata*) varities at varying fertility levels. *Forage Research*. 38(2): 115-118.

Swapna G, Jadesha G and Mahadevu P 2020. Sweet corn – a future healthy human nutrition food. *International Journal of Current Microbiology and Applied Sciences.* 9(7): 3859-3865.

Received on 15.07.2025 and Accepted on 28.08.2025