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Effect of different levels of urea-DAP and Konkan Annapurna briquettes on growth and yield of chilli (*Capsicum annuum* L.) in lateritic soils of Konkan region

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Abstract
The field trial was conducted at Instructional Farm, Department of Agronomy, College of Agriculture, Dapoli, Ratnagiri, Maharashtra in lateritic soils of Konkan, during *rabi*, 2022 to study the effect of different levels of Urea-DAP and Konkan Annapurna Briquettes on growth and yield of chilli (*Capsicum annuum* L.) in lateritic soils of Konkan region. Significant effects and higher values were observed with respect to plant height, number of branches plant^{-1} and dry matter production at harvest stage of chilli crop with the application of treatment 100% N ha^{-1} through KAB whereas, least values were recorded with absolute control treatment. The yield attributing characters *viz*., single fruit weight of chilli (g), average length of fruit (cm), number of fruits plant^{-1}, average weight of fruits plant^{-1} were significantly influenced with higher values in treatment application of 100% N ha^{-1} through KAB. The treatment 100% N ha^{-1} through KAB recorded significantly higher green fruit yield (16.98 t ha^{-1}) and stover yield (1.49 t ha^{-1}).

Keywords: Chilli, growth, Konkan Annapurna briquette, urea-DAP briquette and yield

Introduction
Chilli is India's most important commercial crop, which is grown throughout the country. Nutrient management in vegetable crops has increased importance as consumption of straight fertilizers is increased at tremendous rate. There is no denying the significance and accessibility of straight fertilizers, but crop availability owing to leaching and other losses makes them less effective and result in lower yield. In order to increase output and keep production costs at a manageable level, slow- release fertilizers must be used as efficiently as possible. To minimize the losses of nutrients and increase the productivity of crop we should move towards the fertilizer briquettes as solution. Urea-DAP briquettes (34:18:00) and Konkan Annapurna briquettes (34:14:06) are good option for straight fertilizers as reduces fertilizer losses, increase crop productivity and nutrient uptake.

Deep placement of fertilizers Urea Super Granules (USG) and NPK briquette into the anaerobic soil zone is an effective method to reduce volatilization loss. Researchers have found that there is a clear and practically permanent need for NPK for the creation of high yielding crop cultivars. Fertilizer Deep Placement (FDP) is innovative proven technology that achieves average yield increase while reducing the fertilizer use by about 1/3rd. Fertilizer briquettes hammered into the ground reduce runoff, fixation, leaching, and volatilization loss (Bautista *et al*., 2001) [1].

The low use efficiency of N and P is because of various reasons such as volatilization, denitrification, surface runoff, leaching losses and fixation in soil for phosphorus. The volatilization loss of prilled urea is very high and farmer loss huge amount of money for N fertilizer and proposed that to control this loss deep placement of fertilizer may a good option to minimize production cost as well as to increase yield (Khalil *et al*., 2009) [9]. Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth has recommended the different formulation of briquettes which reduces the consumption and input cost of the fertilizers as well as increases nutrient use efficiency, production and quality of the crop which is helpful for the farmers to get a good yield.

Materials and Methods

The present investigation was conducted at Instructional Farm of Agronomy, College of Agriculture, Dapoli, Dist. Ratnagiri during *rabi*, 2022. The field experiment was carried out in randomized block design (RBD) replicated thrice. The experiment consists of eight treatments *viz.*, T_1: Absolute control, T_2: 100% RDF (150:50:50 NPK kg ha^{-1}) through straight fertilizers, T_3: 50% N ha^{-1} through Urea-DAP Briquettes (UDB), T_4: 75% N ha^{-1} through Urea-DAP Briquettes (UDB), T_5: 100% N ha^{-1} through Urea-DAP Briquettes (UDB), T_6: 50% N ha^{-1} through Konkan Annapurna Briquettes (KAB), T_7: 75% N ha^{-1} through Konkan Annapurna Briquettes (KAB) and T_8: 100% N ha^{-1} through Konkan Annapurna Briquettes (KAB) replicated thrice. The gross and net plot size were 4.80 m × 4.50 m and 3.60 m × 3.60 m, respectively. Seedlings were transplanted with spacing 60 cm × 45 cm.

Briquettes and fertilizer application

The briquettes were applied at 5, 35 and 60 DAT of chilli seedlings. The urea-DAP and Konkan Annapurna briquettes were applied as per the treatment *i.e.*, 50, 75 and 100% recommended dose of N for each treatment. The briquettes were applied 4-5 cm away from the stem of plant at depth of 4 to 5 cm. Single briquette in single pit was applied and covered with soil. For treatment containing 100% RDF ⅓ rd N, full dose of P_2O_5 and K_2O applied at 5 DAT and remaining ⅔rd N applied at 30 and 60 DAT by ring method. After that irrigation was given. The details of briquettes application of different treatments are mentioned below;

a) Time of Application

1. For 50% N ha^{-1} through UDB and KAB first briquette at 5 DAT and second briquette at 35 DAT
2. For 75% N ha^{-1} through UDB and KAB first briquette at 5 DAT, second briquette at 35 DAT and third briquette at 60 DAT
3. For 100% N ha^{-1} through UDB and KAB first briquette at 5 DAT, second briquette at 35 DAT and third and fourth briquettes at 60 DAT

b) Method of application: Soil placement at depth of 4 to 5 cm.

Result and Discussion

Effect on growth attributes

The growth parameters like plant height (cm), number of branches plant^{-1}, dry matter yield plant^{-1} (g) at harvest of the chilli crop and days to initiation of flowering affected by different doses of urea-DAP and Konkan Annapurna Briquettes treatments are presented in the Table 1. The treatments of UDB and KAB significantly influenced the growth of the chilli plant as compare to absolute control and recommended dose of fertilizer application treatments.

Table 1: Effect of Konkan Annapurna and Urea-DAP briquettes on growth of chilli

Treatment	Plant height (cm)	Number of branches plant^{-1}	Dry matter production plant^{-1} (g)	Days to flower initiation
T_1	45.1	10.65	46.74	55.28
T_2	71.0	17.43	68.19	52.69
T_3	59.4	11.4	53.86	51.00
T_4	69.0	15.8	65.98	54.00
T_5	77.1	19.6	76.74	53.00
T_6	60	12.24	55.66	52.17
T_7	72.6	18.8	70.33	53.00
T_8	78.9	20.2	80.89	51.00
S.E(±m)	2.04	0.48	1.99	1.76
C.D. at 5%	6.19	1.46	6.03	NS
General mean	66.6	15.77	64.80	52.77

There was significant difference between treatments for the plant height at the harvest. Among the different treatments, treatment T_8 (100% N ha^{-1} through KAB) recorded significantly taller plants *i.e.*, 78.9 cm. While, treatments T_5 (100% N ha^{-1} through UDB) and T_7 (75% N ha^{-1} through KAB) were statistically at par with treatment T_8. It might be due to the slow release of nutrients applied through KAB nourishing the chilli crop for the entire growth period. The results are in close agreement with the findings of Dademal (2018) [3] in chilli.

There was significant difference in number of branches among different treatments at harvest. The treatment T_8 (100% N ha^{-1} through KAB) recorded significantly higher number of branches *i.e.*, 20.2 at harvest of crop. While, treatments T_5 (100% N ha^{-1} through UDB) and T_7 (75% N ha^{-1} through KAB) were statistically at par with treatment T_8. The increase in the number of branches plant^{-1} may be due to less losses and better uptake of plant nutrients due to application of fertilizer in briquettes form. This supplied balance nutrients to crop throughout the growth period. Similar findings were recorded by Tapkeer *et al.* (2015) [14] in dolichos bean related to number of branches.

There was significant difference in dry matter production plant^{-1} among different treatments at harvest. The treatment T_8 (100% N ha^{-1} through KAB) recorded significantly higher dry matter production *i.e.*, 80.89 g. While, treatments T_5 (100% N ha^{-1} through UDB) was statistically at par with treatment T_8. Treatment T_1 *i.e.*, absolute control showed lowest dry matter production. The maximum dry matter production plant^{-1} (g) might be due to steady and slow availability of nitrogen at early as well as later growth phase and availability of phosphorus and potassium in root zone. This might be due to similar trend recorded in growth parameters and resulted into greater accumulation of dry matter in plant. These results are in the line with the observation made by and Darade *et al.* (2009) [4]. There was no significant difference among different treatments for days to flower initiation of chilli.

Effect on yield and yield attributing characters

The single fruit weight of chilli (g), was significantly influenced due to different briquettes application treatments. The single fruit weight of chilli was significantly higher with

application 100% N ha^{-1} through KAB (T_8) *i.e*., 6.02 g. While treatments T_5 (100% N ha^{-1} through UDB) and T_7 (75% N ha^{-1} through KAB) were statistically at par to treatment T_8. It might be due to application of balance nutrition through KAB at various stages of crop whenever the crop required nutrition. The similar results related to the single fruit weight reported by Torane (2014) [15] in cucumber.

The average length of fruit was significantly influenced by different treatments. Treatment T_8 (100% N ha^{-1} through KAB) showed significantly higher length of fruit (11.6 cm) as compared to other treatments, whereas treatments T_5 and T_7 were statistically at par with treatment T_8. Treatment T_1 (absolute control) recorded lowest value for average fruit length (8.4 cm). It might be due to the slow release of nutrients through KAB for longer time. The similar results related to the length of fruit reported by Kadam *et al.* (2017) [6] in okra.

Number of fruits plant^{-1} was significantly influenced by different treatments. Number of fruits plant^{-1} was significantly higher (84.6) with treatment T_8-application of 100% N ha^{-1} through KAB. While treatments T_5-100% N ha^{-1} through UDB, T_7 -75% N ha^{-1} through KAB and T_2- 100% RDF through straight fertilizers were statistically at par with the treatment T_8. The increase in the number of fruits plant^{-1} of chilli is closely associated with growth parameters like plant height, number of branches and number of leaves also number of fruits plants^{-1} can be attributed to the nutrient availability and it's uptake by plant. Balance nutrients supply might have caused increase in the chlorophyll content in the leaves resulted in increase in the synthesis of carbohydrates and buildup of more new cells which might have increased number of fruits plant^{-1} (Maynard *et al.* 1962) [12]. These results are in conformity with Kadam *et al.* (2005) [8] and Kokare *et al.* (2015) [10].

There was significant difference between treatment for average weight of fruits plant^{-1}. Application of 100% N ha^{-1} through KAB (T_8) recorded significantly higher average weight of fruits plant^{-1} (509.41 g) over other treatments while application of 100% N ha^{-1} through UDB (T_5) and 75% N ha^{-1} through KAB (T_7) were statistically at par to treatment T_8 with 481.21 and 453.79 g average weight of fruits plant^{-1} respectively. It might be due to slow release of nutrients through KAB for longer period. Bhattarai *et al.* (2011) [2] opined that the deep placement of fertilizer in briquette form significantly improves the yield and profitability. The same results were recorded by Kadam *et al.* (2005) [8] in tomato, Kokare *et al.* (2013) [11] and Dademal (2018) [3] in chilli.

Table 2: Effect of Konkan Annapurna and Urea-DAP briquettes on yield and yield attributing characters of chilli

Treatment	Single fruit weight (g)	Average length of fruit (cm)	Number of fruits plant^{-1}	Average weight of fruits plant^{-1} (g)	Yield per plot (kg)	Fruit yield (t ha^{-1})	Stover Yield (t ha^{-1})
T_1	3.79	8.4	58.54	223.08	16.22	7.51	0.97
T_2	5.5	10.6	79.28	436.61	32.28	14.94	1.37
T_3	5.02	8.6	67.79	341.04	24.56	11.37	1.15
T_4	5.25	9.8	76.01	399.3	28.75	13.31	1.28
T_5	5.91	11.0	81.31	481.21	34.65	16.04	1.43
T_6	5.1	9.3	71.82	367.17	26.61	12.32	1.19
T_7	5.68	10.7	79.81	453.79	32.67	15.13	1.37
T_8	6.02	11.6	84.6	509.41	36.68	16.98	1.49
S.E.(±m)	0.15	0.3	2.34	22.93	0.88	0.41	0.04
C.D. at 5%	0.45	0.96	7.11	69.55	2.66	1.23	0.12
General mean	5.28	10.0	74.9	401.45	29.05	13.45	1.28

There was significant difference between treatment for yield per plot (kg) and yield (t ha^{-1}) of chilli. Yield per plot (kg) was significantly higher in treatment (T_8) receiving 100% N ha^{-1} through KAB *i.e*., 36.68 kg. Treatment (T_5) receiving 100% N ha^{-1} through UDB was statistically at par to treatment T_8 with yield plot^{-1} of 34.65 kg. Also, treatment (T_8) receiving application of 100% N ha^{-1} through KAB recorded significantly highest yield (16.98 t ha^{-1}) as compared to other treatments whereas treatments (T_5) receiving of application 100% N ha^{-1} through UDB was statistically at par with treatment T_8 with yield of 16.04 t ha^{-1}. This might be due to higher N rate, which primarily increased the chlorophyll concentration in leaves and there by higher photosynthetic rate and ultimately plenty of photosynthates available during fruit development. The deep placement of these briquette resulted into least losses of nutrient owing to low leaching and less loss through runoff followed by better retention and release of nutrients. The same results were obtained by Kadam *et al*. (2017) [7] in okra, Torane *et al*. (2014) [15] in cucumber, Rane *et al*. (2019) [13] in rice, Kokare *et al*. (2013) [11] and Dademal (2018) [3] in chilli.

There was significant difference between treatment for stover yield (t ha^{-1}) of chilli. Treatment (T_8) receiving 100% N ha^{-1} through KAB recorded significantly highest stover yield (1.49 t ha^{-1}) as compared to other treatments. Whereas treatments T_5, T_7 and T_2 were statistically at par with treatment T_8. It might be due to the slow release of nutrients through KAB for longer period which helped to release nutrients whenever required by the plant and less losses of nutrients followed by better retention. Which reflected in terms of higher stover yield. The increased dry matter production may be attributed to greater accumulation of photosynthates by vegetative parts and fruits. Similar findings were also reported by Durgude *et al*. (2005) and Rane *et al*. (2019) [13] in rice, Torane (2014) [15] in cucumber, Dademal (2018) [3] in chilli.

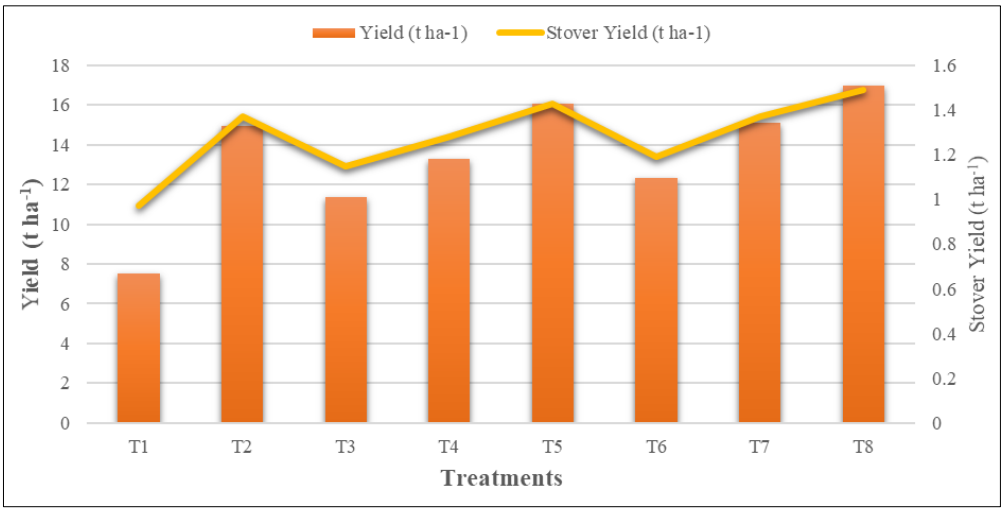

Fig 1: Yield (t ha^{-1}) & stover yield (t ha^{-1}) of chilli as influenced by different treatments

Conclusion

The study on the effect of application of Konkan Annapurna briquettes and urea-DAP briquettes on growth and yield of chilli (var. Sitara)) under lateritic soils of Konkan region concluded that, the application of 100% N ha^{-1} through Konkan Annapurna briquettes (T_8) at 5, 35 and 60 days after transplanting results in significantly higher growth parameters *i.e.*, plant height (cm), number of branches, dry matter production of chilli (g), yield attributes *viz*. number of fruits $plant^{-1}$, fruit length (cm), single fruit weight (g), and weight of fruits $plant^{-1}$, yield (fruit and stover kg ha^{-1}) of chilli. The percent increase in yield due to the treatment T_8 *i.e.*, 100% N ha^{-1} through KAB was to the tune of 55.8% as compared to absolute control (T_1). Comparing the yield among 75% N through KAB and RDF (150:50:50 kg N:P_2O_5:K_2O kg ha^{-1}) application, there is fertilizer saving of 37.5:3.68:30.15 kg N:P_2O_5:K_2O ha^{-1} by using 75% N through KAB indicates an alternative option against RDF in chilli.

References

1. Bautista EU, Koike M, Suministrado DC. Power and machinery: Mechanical deep placement of nitrogen in wetland rice. Journal of the Agricultural Engineering Research. 2001;78(4):333-346.
2. Bhattarai SP, Palada MC, Midmore DJ, Wu D, Salas R. On-farm evaluation of fertilizer briquettes and low-cost drip irrigation for smallholder vegetable production in Cambodia. Irrigation and Drainage. 2011;60:318-329.
3. Dademal AA. Effect of micronutrient fortified Konkan Annapurna Briquettes (KAB) on chilli in lateritic soils of Konkan region. Unpublished Ph. D. (Agri.) Thesis, Dr. B. S. K. K. V., Dapoli, Maharashtra, India; c2018.
4. Darade AB, Bankar KB. Yield attributes and yield of hybrid rice as affected by placement of Urea-DAP briquettes and zinc levels. International Journal of Agricultural Sciences. 2006;5(2):510-512.
5. Durgude AG, Patil YJ, Bulbule AV, Patil VS. Effect of fertilizer management through Urea-DAP briquettes in low land rice. An Asian Journal of Soil Science. 2008;3(1):1-3
6. Kadam DR. Effect of boron and Konkan Annapurna Briquettes (KAB) on yield and nutrient uptake by okra (*Abelmoschus esculentus* L.). M. Sc. (Agri.) Thesis, Dr. B. S. K. K. V., Dapoli, Maharashtra, India, 2017.
7. Kadam DR, Kasture MC, Dodake SB, Dhopavkar RV, Dademal AA. Effect of boron and Konkan Annapurna Briquttes on yield, nitrogen use efficiency and nutrient uptake by okra (*Abelmoschus esculentus* L.). International Journal of chemical studies. 2017;5(3):214-217.
8. Kadam JR, Sahane JS, Kareppa SM. Effect of NPK briquettes on movement and availability of nutrients in soil and yield of tomato. Journal of Maharashtra Agriculture Universities. 2005;30(2):131-134.
9. Khalil ML, Buegger F, Schrami M, Guster R, Richards KG, Schmidhculter U. Gaseous nitrogen losses from a combisol cropped to spring wheat with urea size and placement depths. Journal of Soil Science Society of America. 2009;73(4):1335-1344.
10. Kokare VG, Kasture MC, Palsande NP, Mhalshi RM. Effect of different fertilizer briquettes and organic manures on yield, nutrients uptake and chemical properties of soil in chilli (*Capsicum annum* L.) in lateritic soils of Konkan. International Journal of Agricultural Science and Research. 2015;5(2):13-18.
11. Kokare VG. Studies on effect of different fertilizer briquettes and organic manures on yield, nutrients uptake and chemical properties of soil in chilli (*Capsicum annum* L.) in lateritic soils of Konkan. M. Sc. (Agri.) Thesis, Dr. B. S. K. K. V., Dapoli, Maharashtra, India, 2013.
12. Maynard DN. Influence of nitrogen levels on flowering and fruit set of peppers. American Society of Horticulture Science. 1962;10:385-389.
13. Rane HD, Gokhale NB, More SS, Kasture MC. Influence of briquette fertilizer of nitrogen and silica on paddy. Journal of Agricultural Science. 2019;1(2):20-26.
14. Tapkeer PB. Studies on the effect of different fertilizer briquettes on yield nutrient uptake and soil fertility status of dolichos bean (*Dolichos lablab* L.) in lateritic soil of Konkan. M. Sc. (Agri.) Thesis, Dr. B. S. K. K. V., Dapoli, Maharashtra, India, 2015.
15. Torane HB. Studies on the efficacy of Konkan Annapurna Briquettes (KAB) with different coating material on yield and quality of cucumber (*Cucumis sativus* L.) in lateric soils of Konkan. M. Sc. (Agri.) Thesis, Dr. B. S. K. K. V., Dapoli, Maharashtra, India; c2014.