Biological Forum – An International Journal **15(10): 1623-1631(2023)**

ISSN No. (Print): 0975-1130
ISSN No. (Online): 2249-3239

Growth and Yield of Brinjal as influenced by Zinc and Boron fortified Briquettes in Lateritic soils of Konkan

Patil S.S.[1]*, Dodake S.B.[2], Kasture M.C.[3], Sanap P.B.[4], More V.G.[5] and Vaidya K.P.[6]

[1]Ph.D. Scholar, Department of Soil Science and Agricultural Chemistry, Dr. BSKKV, Dapoli (Maharashtra), India.
[2]Head, Department of Soil Science and Agricultural Chemistry, Dr. BSKKV, Dapoli (Maharashtra), India.
[3]Professor (I/c) Department of Soil Science and Agricultural Chemistry, College of Agriculture, Dr. BSKKV, Dapoli (Maharashtra), India.
[4]Vegetable Specialist, Vegetable Improvement Scheme, Central Experimental Station, Wakawali, Ratnagiri (Maharashtra), India.
[5]Agrometeorologist, AICRP on Agrometeorology, Department of Agronomy, Dr. BSKKV, Dapoli (Maharashtra), India.
[6]Khar Land Scientist, Khar Land Research Station, Panvel (Maharashtra), India.

(Corresponding author: Patil S.S.)*
(Received: 03 September 2023; Revised: 25 September 2023; Accepted: 09 October 2023; Published: 15 October 2023)
(Published by Research Trend)

ABSTRACT: An experiment was carried out during the *rabi* seasons of 2021-22 and 2022-23 to investigate the influence of zinc and boron fortified briquettes on brinjal growth, yield, and economics. There were three levels of recommended dose of nitrogen *viz.* 100, 80 and 60 per cent through Konkan Annapurna Briquettes (KAB) with and without fertilization of zinc and boron. The recommended dose of straight fertilizers with and without zinc and boron was also included in the experiment. The result revealed that the higher brinjal growth and fruit yield (31.43 and 31.99 t ha^{-1}) Konkan region of Maharashtra obtained with the application of 100 per cent nitrogen through Konkan Annapurna Briquettes (KAB) fortified with 2 kg B and 3 kg Zn per hectare followed by 80 per cent N through Konkan Annapurna Briquettes (KAB) fortified with 2 kg B and 3 kg Zn per hectare.

Keywords: Brinjal, Zinc, Boron, Fortified, Konkan Annapurna Briquettes and Growth rate.

INTRODUCTION

Brinjal (*Solanum melongena* L.) belongs to the family Solanaceae with diploid chromosome number 2n = 24. Owing to its highest production potential it is also termed as poor man's vegetable. Aubergine is the British name of brinjal and in United States, Australia and Canada, it is known by the name eggplant, because fruits of earlier cultivars resembled with eggs of hen. Brinjal accounts for around 6.62 percent of total vegetable acreage in India and 6.34 percent of total vegetable production (Anonymous, 2022a). In India, the area under brinjal cultivation is 764.55 thousand hectares, with a production of 12607.36 thousand tonnes and a productivity of 16.49 MT ha^{-1}. In Maharashtra, the area under brinjal cultivation is 19.09 thousand hectares, with an annual yield of 320.57 thousand tonnes and a productivity of 16.79 MT ha^{-1} (Anonymous, 2023).

Brinjal producers in Maharashtra's Konkan area have reported low brinjal yield in recent years. It clearly had an impact on total brinjal production in the country. One explanation for lesser production might be an uneven use of fertilizers and manure, as well as low levels of accessible Zn and B in key brinjal growing areas' soils (Bose and Tripathi 1996). Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, recommended Konkan Annapurna Briquettes (KAB) for submerged rice, these is prepared by combining urea with Godavari (14:35:14), and the resulting KAB has 34:14:06 per cent N: P_2O_5: K_2O, respectively. Some researchers like Kokare *et al*. (2015); Tapkeer *et al*. (2017) documented the utility and economic feasibility of application of Konkan Annapurna briquettes (KAB) for increasing yield of *kharif* as well as *rabi* crops and sustaining soil fertility of lateritic soils of Konkan region. The several investigations on brinjal fertilization have been carried out in Konkan region. But the meagre information is available regarding the use of zinc and boron fortified briquettes in brinjal. Considering the above fact, the present study entitled "Growth and yield of brinjal as influenced by zinc and boron fortified briquettes in lateritic soils of Konkan" was undertaken.

MATERIAL AND METHODS

Experimental site is situated in between latitude of 17°45'57.186" N and longitude of 73°10' 24.09276" E. in Konkan region of Maharashtra. During the *rabi* season (November to April) of the years 2021-22 and 2022-23, the experiment was carried out in the Research Farm of Department of Agronomy, College of Agriculture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Dist. Ratnagiri.

The soil of experimental site of the present investigation was typical lateritic soil. The initial soil sample was collected in October, 2022. The soil was sandy loam in texture, moderately acidic in reaction (pH 6.74), low in salt content (0.12 dS m^{-1}), extremely rich in organic carbon (19.11 g kg^{-1}), low in available nitrogen (203.84 kg ha^{-1}) and phosphorus (12.30 kg ha^{-1}), and was moderate in available potassium (201.60 kg ha^{-1}).

The field experiment was laid out in Randomized Block Design (RBD) comprising of nine treatments replicated thrice. The brinjal variety Konkan Prabha developed by the Dr. B. S. K. K. V., Dapoli was taken for the study

The experiment comprises of nine treatments *viz.*, Absolute control, RDF (150:50:50 N: P_2O_5: K_2O kg ha^{-1}) through straight fertilizers, 100 % N through Konkan Annapurna Briquettes (KAB), 80 % N through Konkan Annapurna Briquettes (KAB), 60 % N through Konkan Annapurna Briquettes (KAB), RDF + 2 kg Boron + 3 kg Zinc ha^{-1}, 100 % N through KAB fortified with 2 kg boron + 3 kg zinc ha^{-1}, 80 % N through KAB fortified with 2 kg boron + 3 kg zinc ha^{-1} and 60 % N through KAB fortified with 2 kg boron + 3 kg zinc ha^{-1}

Note: 1) Boron and zinc were given through borax and zinc sulphate, respectively in T_6 and in T_7, T_8 and T_9 it was fortified with Konkan Annapurna Briquettes.

2) FYM @ 20 t ha^{-1} was given to all the treatments except T_1 (Absolute control) treatment.

Straight fertilizer application: In treatment T_2 and T_6 nitrogen @150 kg ha^{-1} was applied in three splits *viz*, first dose of 1/3 was applied at transplanting, second 1/3 dose at 30 days after transplanting and third 1/3 dose at 60 days after transplanting. Phosphorus at 50 kg ha^{-1} and potassium at 50 kg ha^{-1} were applied in single dose at the time of transplanting in the corresponding treatments by ring method of fertilizer application.

The two types of briquettes *i.e*., Konkan Annapurna Briquettes (KAB) and Konkan Annapurna Briquette fortified with 2 kg boron and 3 kg zinc ha^{-1} were used in the experiment.

In KAB, 100 % N through briquette treatment, three and half (3.5) briquettes were given in each split application in between two plants. In 80 % N through briquette treatment, three (3) briquettes were given in each split application in between two plants. In 60 % N through briquette treatment, one (1) briquette was given in each split application to one plant.

In Konkan Annapurna Briquette fortified with 2 kg boron and 3 kg zinc ha^{-1}, 100 % N through briquette treatment, two (2) briquettes were given in each split application one plant. In 80 % N through briquette treatment, three (3) briquettes were given in each split application in between two plants. In 60 % N through briquette treatment, one (1) briquette was given in each split application to one plant. Briquettes were applied to the field by a deep placement method.

The various growth parameters were calculated as per the details given below:

Relative Growth Rate (RGR): Blackman (1919) pointed out that the increase in dry matter weight is a continuous process of compound interest and the increase in any interval adds to the 'Capital' for subsequent growth and is calculated by using following equation given by Briggs *et al.* (1921).

$$\text{Relative Growth Rate (RGR)} = \frac{\text{Log}_e W_2 - \text{Log}_e W_1}{t_2 - t_1}$$

Where, Log_e = natural logarithms, W_1 and W_2 are dry matter at time t_1 and t_2 in days, respectively. Unit of RGR is mg mg^{-1} day^{-1}.

Absolute Growth Rate (AGR): The rate of increase in growth variable *i.e.,* weight (W) at time (t) is called absolute growth rate (AGR). This measures the differential coefficient of weight (W) with respect to time 't'. It is generally expressed in g day^{-1} and it is calculated by using following equation.

$$\text{Absolute Growth Rate (AGR)} = \frac{W_2 - W_1}{t_2 - t_1}$$

Where, W_1 and W_2 refers to dry matter weight (g) of plant at time t_1 and t_2 respectively.

Crop Growth Rate (CGR): CGR represents total dry matter productivity of the community per unit land area over a certain time span. It is generally expressed in g m^{-2} day^{-1}. It is calculated by using following equation (Watson, 1958).

$$\text{Crop Growth Rate (CGR)} = \frac{W_2 - W_1}{t_2 - t_1} \frac{1}{P}$$

Where, W_1 and W_2 refers to dry matter weight (g) of plant at time t_1 and t_2 respectively and P = ground area

Net Assimilation Rate (NAR): NAR is rate of increase in whole plant dry weight per unit leaf area. It indicates rate of net photosynthesis. It is expressed as mg cm^{-2} day^{-1}. It was calculated using the following formula proposed by Gregory *et al*. (1917) which was modified by Williams (1946).

$$\text{Net Assimilation Rate (NAR)} = \frac{(W_2 - W_1)(\text{Log}_e L_2 - \text{Log}_e L_1)}{(L_2 - L_1)(t_2 - t_1)}$$

Where L_1 and L_2 is leaf area at time t_1 and t_2 and W_1 and W_2 is dry weight of plant at time t_1 and t_2, respectively and Log_e = natural logarithm.

Leaf Area Index (LAI): Leaf area index was calculated by dividing area of leaves with ground area over which it is growing (Watson, 1947).

$$\text{Leaf Area Index (LAI)} = \frac{\text{Leaf Area}}{\text{Ground area}}$$

The mature fruits were collected after each picking and weighed immediately from each plot. Fruits were weighed after all pickings and recorded and it was totalled up and expressed as fruit yield of brinjal in kilograms per plot. In addition to this brinjal yield in t ha^{-1} was also calculated. The economics of brinjal as affected by fertilizers and briquettes was worked out considering the prevailing market rates for different inputs and produces. The gross return and cost of cultivation were worked out by considering the price rates.

RESULTS AND DISCUSSION

A. Growth attributing characters of brinjal (Growth rates)

Relative growth rate (RGR) of brinjal (g g^{-1} day^{-1}): Data on the effect of zinc and boron fortified briquettes on the relative growth rate (RGR) of brinjal at different growth stages *viz.*, at 30, 60, 90, 120 DAT and 140 DAT of brinjal crop are presented in Table 1.

At 30-60 Days After Transplanting (DAT). A critical look on the data revealed that relative growth rate (RGR) showed variation from 0.0132 to 0.0321 g g^{-1} day^{-1} and 0.0177 to 0.0369 g g^{-1} day^{-1} during the years 2021-22 and 2022-23, respectively. The lowest (0.0132 and 0.0177 g g^{-1} $daSy^{-1}$) and the highest (0.0321 and 0.0369 g g^{-1} day^{-1}) values of relative growth rate of brinjal were observed in the treatment T_1 (absolute control) and T_7 (100 % N through KAB fortified with 2 kg boron + 3 kg zinc ha^{-1}) during the year 2021-22 and 2022-23, respectively.

Table 1: Effect of zinc and boron fortified briquettes on relative growth rate (RGR) of brinjal (g g^{-1} day^{-1}).

Treatment No.	2021-22				2022-23			
	30-60 DAT	60-90 DAT	90-120 DAT	120-140 DAT	30-60 DAT	60-90 DAT	90-120 DAT	120-140 DAT
T_1	0.0132	0.0080	0.0024	0.0015	0.0177	0.0094	0.0036	0.0026
T_2	0.0276	0.0131	0.0048	0.0029	0.0311	0.0136	0.0051	0.0030
T_3	0.0244	0.0127	0.0047	0.0030	0.0300	0.0139	0.0051	0.0031
T_4	0.0179	0.0112	0.0045	0.0027	0.0216	0.0122	0.0047	0.0029
T_5	0.0240	0.0132	0.0041	0.0031	0.0214	0.0131	0.0046	0.0028
T_6	0.0320	0.0150	0.0054	0.0034	0.0331	0.0160	0.0053	0.0034
T_7	0.0321	0.0156	0.0055	0.0036	0.0369	0.0160	0.0057	0.0036
T_8	0.0305	0.0139	0.0047	0.0034	0.0318	0.0141	0.0050	0.0035
T_9	0.0278	0.0131	0.0036	0.0024	0.0327	0.0144	0.0050	0.0031

At 60-90 Days After Transplanting (DAT). The data on relative growth rate (RGR) showed variation from 0.0080 to 0.0156 g g^{-1} day^{-1} and 0.0094 to 0.0160 g g^{-1} day^{-1} during the years 2021-22 and 2022-23, respectively (Table 1). The lowest (0.0080 and 0.0094 g g^{-1} day^{-1}) and the highest (0.0156 and 0.0160 g g^{-1} day^{-1}) values of relative growth rate of brinjal were observed in the treatment T_1 (absolute control) and T_7 (100 % N through KAB fortified with 2 kg boron + 3 kg zinc ha^{-1}) during the year 2021-22 and 2022-23, respectively. Further, the relative growth rate (RGR) of brinjal at 60-90 DAT was found decreased as compared to the relative growth rate (RGR) recorded at 30-60 DAT during the years 2021-22 and 2022-23.

At 90-120 Days After Transplanting (DAT). The relative growth rate (RGR) varied from 0.0024 and 0.0055 g g^{-1} day^{-1} and 0.0036 and 0.0057 g g^{-1} day^{-1} during the years 2021-22 and 2022-23, respectively. The lowest (0.0024 and 0.0036 g g^{-1} day^{-1}) values of relative growth rate of brinjal were observed in the treatment (T_1) *i.e.*, absolute control during the year 2021-22 and 2022-23, respectively. The highest (0.0055 and 0.0057 g g^{-1} day^{-1}) values of relative growth rate of brinjal were observed in the treatment (T_7) receiving 100 % N through KAB fortified with 2 kg boron + 3 kg zinc ha^{-1} during the year 2021-22 and 2022-23, respectively. Further, the relative growth rate (RGR) of brinjal at 90-120 DAT found decreased as compared to the relative growth rate (RGR) recorded at 60-90 DAT during the years 2021-22 and 2022-23.

At 120-140 Days After Transplanting (DAT). The relative growth rate (RGR) ranged from 0.0015 and 0.0036 g g^{-1} day^{-1} and 0.0026 and 0.0036 g g^{-1} day^{-1} during the years 2021-22 and 2022-23, respectively. The lowest (0.0015 and 0.0026 g g^{-1} day^{-1}) and the highest (0.0036 and 0.0036 g $g^{-1}day^{-1}$) values of relative growth rate of brinjal were observed in the treatment T_1 (absolute control) and T_7 (100 % N through KAB fortified with 2 kg boron + 3 kg zinc ha^{-1}) during the year 2.021-22 and 2022-23, respectively. Further, the relative growth rate (RGR) of brinjal at 120-140 DAT found decreased as compared to the relative growth rate (RGR) recorded at 90-120 DAT during the years 2021-22 and 2022-23.

The enhancement in growth parameters could be attributed to the better and proper nourishment of the crop when fertilized through the briquette (Bulbule *et al.*, 2005). It might be due to the slow release of nutrients applied through the KAB nourishing the brinjal crop for the entire growth period. Further improvement in growth characters might be due to application of micronutrients it might have enhanced photosynthesis and there by metabolic activities which lead to an increase in various plant metabolites responsible for cell division and elongation (Hatwar *et al.*, 2003). The photosynthesis was found to be enhanced in the presence of zinc and boron (Rawat and Mathpal, 1984). The presence of zinc activates the synthesis of tryptophan, the precursor of IAA and it is responsible for stimulated plant growth (Mallic and Muthukrishnan, 1979). The relative growth rate is a linear function of the internal nitrogen concentration (Agren, 1985). The RGR values of Ashwagandha were maximum (148.10 to 149.63 mg g^{-1} day^{-1}) under all treatments at very high during early stage (30 DAS), which declined gradually till the maturity (Ahirwar *et al.*, 2017). Similar decreasing trend was observed by the Mahata *et al.*, 2018 in potato and RGR values were in the range of 0.042 to 0.172 g $g^{-1}day^{-1}$. Shubha *et al.* (2019) recorded relative growth rate of ranged from 0.00504 to 0.00808 g g^{-1} day^{-1} in potato. Nongkhlaw *et al.* 2021 found that RGR ranged from 0.005 to 0.016 g $g^{-1}day^{-1}$ in sweet potato.

Absolute growth rate (AGR) of brinjal (g day^{-1}): Data on the effect of zinc and boron fortified briquettes on the absolute growth rate (AGR) of brinjal at different growth stages *viz.*, at 30, 60, 90, 120 DAT and 140 DAT of brinjal crop are presented in Table 2.

At 30-60 Days After Transplanting (DAT). The absolute growth rate (AGR) showed variation from

0.184 to 0.680 g day^{-1} and 0.202 to 0.756 g day^{-1} during the years 2021-22 and 2022-23, respectively (Table 2). The lowest (0.184 and 0.202 g day^{-1}) and the highest (0.680 and 0.756 g day^{-1}) values of relative growth rate of brinjal were observed in the treatment T_1 (absolute control) and T_7 (100 % N through KAB fortified with 2 kg boron + 3 kg zinc ha^{-1}) during the year 2021-22 and 2022-23, respectively.

Table 2: Effect of zinc and boron fortified briquettes on absolute growth rate (AGR) of brinjal (g day^{-1}).

Treatment No.	2021-22				2022-23			
	30-60 DAT	60-90 DAT	90-120 DAT	120-140 DAT	30-60 DAT	60-90 DAT	90-120 DAT	120-140 DAT
T_1	0.184	0.144	0.054	0.033	0.202	0.162	0.075	0.058
T_2	0.553	0.477	0.226	0.152	0.614	0.510	0.250	0.164
T_3	0.622	0.562	0.268	0.190	0.681	0.606	0.294	0.200
T_4	0.362	0.357	0.175	0.120	0.425	0.389	0.196	0.133
T_5	0.358	0.348	0.134	0.107	0.372	0.365	0.170	0.113
T_6	0.572	0.534	0.257	0.184	0.617	0.603	0.273	0.197
T_7	0.680	0.655	0.309	0.221	0.756	0.705	0.343	0.247
T_8	0.549	0.472	0.212	0.170	0.585	0.497	0.233	0.182
T_9	0.406	0.354	0.126	0.091	0.449	0.391	0.180	0.122

At 60-90 Days After Transplanting (DAT). A critical look on the data revealed that absolute growth rate (AGR) showed variation from 0.144 to 0.655 g day^{-1} and 0.162 to 0.705 g day^{-1} during the years 2021-22 and 2022-23, respectively. The lowest (0.144 and 0.162 g day^{-1}) and the highest (0.655 and 0.705 g day^{-1}) values of relative growth rate of brinjal were observed in the treatment T_1 (absolute control) and T_7 (100 % N through KAB fortified with 2 kg boron + 3 kg zinc ha^{-1}) during the year 2021-22 and 2022-23, respectively. Further, the absolute growth rate (AGR) of brinjal at 60-90 DAT was decreased as compared to the absolute growth rate (RGR) recorded at 30-60 DAT during the years 2021-22 and 2022-23.

At 90-120 Days After Transplanting (DAT). The variation in absolute growth rate (AGR) showed range from 0.054 and 0.309 g day^{-1} and 0.075 and 0.343 g day^{-1} during the years 2021-22 and 2022-23, respectively. The lowest (0.054 and 0.075 g day^{-1}) values of relative growth rate of brinjal were observed in absolute control treatment (T_1) during the year 2021-22 and 2022-23, respectively. The highest (0.309 and 0.343 g day^{-1}) values of relative growth rate of brinjal were observed in the treatment (T_7) receiving 100 per cent N through KAB fortified with 2 kg boron + 3 kg zinc ha^{-1} during the year 2021-22 and 2022-23, respectively. Further, the absolute growth rate (AGR) of brinjal at 90-120 DAT found to be decreased as compared to the absolute growth rate (AGR) recorded at 60-90 DAT during the years 2021-22 and 2022-23.

At 120-140 Days After Transplanting (DAT). The absolute growth rate (AGR) ranged from 0.033 and 0.221 g day^{-1} and 0.058 and 0.247 g day^{-1} during the years 2021-22 and 2022-23, respectively (Table.2.) The lowest (0.033 and 0.058 g day^{-1}) and the highest (0.221 and 0.247 g day^{-1}) values of relative growth rate of brinjal were observed in the treatment T_1 (absolute control) and T_7 (100 % N through KAB fortified with 2 kg boron + 3 kg zinc ha^{-1}) during the year 2021-22 and 2022-23, respectively. Further, the relative growth rate (RGR) of brinjal at 120-140 DAT was found to be decreased as compared to the absolute growth rate (AGR) recorded at 90-120 DAT during the years 2021-22 and 2022-23.

The improvement in growth characteristics might possibly be ascribed to the crop receiving better and more complete nourishment when fertilized with briquettes (Bulbule *et al*., 2005). It might be owing to the slow release of nutrients by the Konkan Annapurna Briquette, which nourished the brinjal crop during the growth period. Further improvement in growth characteristics might be attributed by micronutrients, which may have increased photosynthesis and hence metabolic activities, resulting in an increase in numerous plant compounds important for cell division and elongation (Hatwar *et al*., 2003). Photosynthesis rate was found to be improved in the presence of zinc and boron (Rawat and Mathpal 1984). The presence of zinc stimulates plant development by activating the synthesis of tryptophan, the precursor of IAA (Mallic and Muthukrishnan 1979). Dubey *et al*. (2023) found the absolute growth rate (g day^{-1}) in the range of 0.034 to 0.049 g day^{-1} of French bean. Ghule *et al*. (2013) found that the AGR based on total dry matter accumulation per plant per day was very slow during 0 to 30 DAS and very fast during 61 to 90 DAS and slowed down thereafter in Bt cotton. Kulkarni *et al*. (2007) recorded the AGR in range of 64-103 mg week^{-1} and 166-199 mg week^{-1} in tomato and okra, respectively.

Net assimilation rate (NAR) of brinjal (mg cm^{-2} day^{-1}): Data on the effect of zinc and boron fortified briquettes on the net assimilation rate (NAR) of brinjal was studied at different growth stages *viz*., at 30, 60, 90, 120 DAT and 140 DAT of brinjal crop are presented in Table 3.

At 30-60 Days After Transplanting (DAT). The data on net assimilation rate (NAR) showed variation from 0.138 to 0.193 mg cm^{-2} day^{-1} and 0.140 to 0.195 mg cm^{-2} day^{-1} during the years 2021-22 and 2022-23, respectively (Table 3). The lowest (0.138 and 0.140 mg cm^{-2} day^{-1}) and the highest (0.193 and 0.195 mg cm^{-2} day^{-1}) values of net assimilation rate of brinjal were observed in the T_1 (absolute control) and T_7 (100 % N through KAB fortified with 2 kg boron + 3 kg zinc ha^{-1}) treatment during the year 2021-22 and 2022-23, respectively.

Table 3: Effect of zinc and boron fortified briquettes on net assimilation rate (NAR) of brinjal ($mg\ cm^{-2}\ day^{-1}$).

Treatment No.	2021-22				2022-23			
	30-60 DAT	60-90 DAT	90-120 DAT	120-140 DAT	30-60 DAT	60-90 DAT	90-120 DAT	120-140 DAT
T_1	0.167	0.084	0.033	0.022	0.175	0.090	0.043	0.037
T_2	0.184	0.126	0.079	0.065	0.191	0.128	0.083	0.067
T_3	0.188	0.130	0.081	0.075	0.193	0.132	0.085	0.076
T_4	0.140	0.109	0.075	0.055	0.144	0.119	0.079	0.057
T_5	0.138	0.115	0.066	0.064	0.140	0.118	0.075	0.056
T_6	0.167	0.112	0.079	0.075	0.170	0.123	0.080	0.076
T_7	0.193	0.134	0.089	0.086	0.195	0.136	0.094	0.092
T_8	0.172	0.118	0.084	0.077	0.173	0.124	0.086	0.079
T_9	0.163	0.110	0.058	0.053	0.166	0.117	0.077	0.065

At 60-90 Days After Transplanting (DAT). A critical look on the data revealed that net assimilation rate (NAR) showed variation from 0.084 to 0.134 mg cm^{-2} day^{-1} and 0.090 to 0.136 mg cm^{-2} day^{-1} during the years 2021-22 and 2022-23, respectively. The lowest (0.084 and 0.090 mg cm^{-2} day^{-1}) and the highest (0.134 and 0.136 mg cm^{-2} day^{-1}) values of net assimilation rate of brinjal were observed in the treatment T_1 (absolute control) and T_7 (100 % N through KAB fortified with 2 kg boron + 3 kg zinc ha^{-1}) during the year 2021-22 and 2022-23, respectively. Further, the net assimilation rate (NAR) of brinjal at 60-90 DAT decreased as compared to the net assimilation rate (NAR) recorded at 30-60 DAT during the years 2021-22 and 2022-23.

At 90-120 Days After Transplanting (DAT). The net assimilation rate (NAR) varied from 0.022 to 0.086 mg cm^{-2} day^{-1} and 0.043 to 0.094 mg cm^{-2} day^{-1} during the years 2021-22 and 2022-23, respectively. The lowest (0.033 and 0.043 mg cm^{-2} day^{-1}) and the highest (0.089 and 0.094 mg cm^{-2} day^{-1}) values of net assimilation rate of brinjal were observed in the treatment T_1 (absolute control) and T_7 (100 % N through KAB fortified with 2 kg boron + 3 kg zinc ha^{-1}) during the year 2021-22 and 2022-23, respectively. Further, the net assimilation rate (NAR) of brinjal at 90-120 DAT decreased compared to the net assimilation rate (NAR) recorded at 60-90 DAT during the years 2021-22 and 2022-23.

At 120-140 Days After Transplanting (DAT). The net assimilation rate (NAR) ranged from 0.022 to 0.086 mg cm^{-2} day^{-1} and 0.037 to 0.092 mg cm^{-2} day^{-1} during the years 2021-22 and 2022-23, respectively. The lowest (0.022 and 0.037 mg cm^{-2} day^{-1}) and the highest (0.086 and 0.092 mg cm^{-2} day^{-1}) values of net assimilation rate of brinjal were observed in the treatment T_1 (absolute control) and T_7 (100 % N through KAB fortified with 2 kg boron + 3 kg zinc ha^{-1}) during the year 2021-22 and 2022-23, respectively. Further, the net assimilation rate (NAR) of brinjal at 120-140 DAT decreased as compared to the NAR recorded at 90-120 DAT during the years 2021-22 and 2022-23.

Net assimilation rate is an appropriate parameter for the measurement of net photosynthesis of leaves in a crop. Nongkhlaw *et al*. (2021) found that the, different levels of N (0, 35, 50 and 65 kg N ha^{-1}) showed significant difference regarding NAR with a declining trend throughout the growing period *i.e*., initially increases and then decreases with plant age in the early phenological stages, the leaf area is constantly increasing with the development of new leaves which are more exposed to radiation and are more efficient at capturing CO_2 consequently, the production rate of photo-assimilates increases. As time passes, the amount of foliage increases, and thus, the outer leaves shade the inner leaves, decreasing the photosynthetic activity of the shaded leaves in sweet potato NAR was significantly affected by different Ashwagandha base intercropping system up to 90-120 days stage during both years of investigation. It quite high at 30 DAS and from declined drastically till 90 DAS. After this, the NAR strongly raised till 120 DAS furthermore, the NARs rapidly declined till the maturity. Therefore, a typical sigmoid pattern of NAR was noted in Ashwagandha during its entire lifecycle (Ahirwar *et al*., 2017). Net assimilation rate found in a range of 1.14-15.76 mg m^{-2} day^{-1}. Sivakumar and Srividhya (2018) found NAR value in the range of 0.489 to 0.642 mg cm^{-2} day^{-1} in tomato. Shubha *et al*. (2019) recorded net assimilation rate of range 0.001290 - 0.002100 g dm^{-2} day^{-1} $\times 10^{-2}$ in potato. Nkansah *et al*. (2021) recorded net assimilation rate in range of 0.727- 2.92 g cm^{-2} day^{-1} in tomato.

Crop growth rate (CGR) of brinjal (g m^{-2} day^{-1}): Data on the effect of zinc and boron fortified briquettes on the crop growth rate (CGR) of brinjal was studied at different growth stages *viz*., at 30, 60, 90, 120 DAT and 140 DAT of brinjal crop are presented in Table 4.

At 30-60 Days After Transplanting (DAT). The data on crop growth rate (CGR) showed variation from 0.510 to 1.524 g m^{-2} day^{-1} and 0.562 to 2.100 g m^{-2} day^{-1} during the years 2021-22 and 2022-23, respectively (Table 4). The lowest (0.510 and 0.562 g m^{-2} day^{-1}) and the highest (1.524 and 2.100 g m^{-2} day^{-1}) values of crop growth rate of brinjal were observed in the treatment T_1 (absolute control) and T_7 (100 % N through KAB fortified with 2 kg boron + 3 kg zinc ha^{-1}) treatment during the year 2021-22 and 2022-23, respectively.

At 60-90 Days After Transplanting (DAT). A critical look on the data revealed that crop growth rate (CGR) showed variation from 0.399 to 1.821 g m^{-2} day^{-1} and 0.450 to 1.959 g m^{-2} day^{-1} during the years 2021-22 and 2022-23, respectively. The lowest (0.399 and 0.450 g m^{-2} day^{-1}) and the highest (1.821 and 1.959 g m^{-2} day^{-1})

values of crop growth rate of brinjal were observed in the treatment T_1 (absolute control) and T_7 (100 % N through KAB fortified with 2 kg boron + 3 kg zinc ha^{-1}) during the year 2021-22 and 2022-23, respectively. Further, the crop growth rate (CGR) of brinjal at 60-90 DAT decreased as compared to crop growth rate (CGR) recorded at 30-60 DAT during the years 2021-22 and 2022-23.

At 90-120 Days After Transplanting (DAT). The variation in crop growth rate (CGR) showed range from 0.149 to 0.860 g m^{-2} day^{-1} and 0.209 to 0.953 g m^{-2} day^{-1} during the years 2021-22 and 2022-23, respectively. The lowest (0.149 and 0.209 g m^{-2} day^{-1}) and the highest (0.860 and 0.953 g m^{-2} day^{-1}) values of crop growth rate of brinjal were observed in the treatment T_1 (absolute control) and T_7 (100 % N through KAB fortified with 2 kg boron + 3 kg zinc ha^{-1}) during the year 2021-22 and 2022-23, respectively. Further, the crop growth rate (CGR) of brinjal at 90-120 DAT decreased as compared to crop growth rate (CGR) recorded at 60-90 DAT during the years 2021-22 and 2022-23.

Table 4: Effect of zinc and boron fortified briquettes on crop growth rate (CGR) of brinjal (g m^{-2} day^{-1}).

Treatment No.	2021-22				2022-23			
	30-60 DAT	60-90 DAT	90-120 DAT	120-140 DAT	30-60 DAT	60-90 DAT	90-120 DAT	120-140 DAT
T_1	0.510	0.399	0.149	0.092	0.562	0.450	0.209	0.162
T_2	1.535	1.324	0.627	0.422	1.704	1.416	0.696	0.455
T_3	1.727	1.560	0.745	0.529	1.892	1.682	0.816	0.556
T_4	1.005	0.993	0.485	0.332	1.180	1.080	0.545	0.371
T_5	0.996	0.968	0.373	0.298	1.034	1.014	0.472	0.315
T_6	1.588	1.483	0.715	0.510	1.715	1.676	0.758	0.546
T_7	1.890	1.821	0.860	0.614	2.100	1.959	0.953	0.687
T_8	1.524	1.313	0.590	0.471	1.626	1.380	0.648	0.506
T_9	1.127	0.983	0.349	0.253	1.246	1.085	0.499	0.339

At 120-140 Days After Transplanting (DAT). The crop growth rate (CGR) ranged from 0.092 to 0.614 mg cm^{-2} day^{-1} and 0.162 to 0.687 mg cm^{-2} day^{-1} during the years 2021-22 and 2022-23, respectively. The lowest (0.092 and 0.162 mg cm^{-2} day^{-1}) and the highest (0.614 and 0.0687 mg cm^{-2} day^{-1}) values of crop growth rate of brinjal were observed in the treatment T_1 (absolute control) and T_7 (100 % N through KAB fortified with 2 kg boron + 3 kg zinc ha^{-1}) during the year 2021-22 and 2022-23, respectively. Further, the crop growth rate (CGR) of brinjal at 120-140 DAT decreased as compared to the CGR recorded at 90-120 DAT during the years 2021-22 and 2022-23.

Sharma *et al*. (2019) recorded that the CGR, in general, tended to increase up to 30-60 DAP in potato and then decreased up to 60-maturity stage under the cowpea-potato based cropping system (0.63–17.17 g m^{-2} day^{-1}). It may be due to starting of abscission and senescence and aging of leaves at later stages of crop growth. Shubha *et al*. (2019) found the crop growth rate (CGR) at 60-90 Days 0.85-1.37 g m^{-2} day^{-1} in potato. Ahirwar *et al*. (2017) founds that the CGR of Ashwagandha showed a linear till to maturity, but rate of increment in CGR was slowed down during the period between 90 to 150 DAS (2.93-7.17 mg m^{-2} day^{-1}). Sivakumar and Srividhya (2018) found CGR value in the range of 12.35-16.20 g m^{-2} day^{-1} in tomato.

Leaf area index (LAI) of brinjal: Data on the effect of zinc and boron fortified briquettes on the leaf area index (LAI) of brinjal at different growth stages *viz*., at 30, 60, 90, 120 DAT and 140 DAT of brinjal crop are presented in Table 5.

At 30 Days After Transplanting (DAT). A critical look on the data revealed that leaf area index (LAI) varied from 0.17 to 0.66 and 0.18 to 0.67 during the years 2021-22 and 2022-23, respectively (Table 5). The lowest (0.17 and 0.18) and the highest (0.66 and 0.67) values of leaf area index (LAI) of brinjal were observed in the treatment T_1 (absolute control) and T_7 (100 % N through KAB fortified with 2 kg boron + 3 kg zinc ha^{-1}) treatment during the year 2021-22 and 2022-23, respectively.

At 60 Days After Transplanting (DAT). The data on leaf area index (LAI) showed variation from 0.50 to 1.57 and 0.52 to 1.63 during the years 2021-22 and 2022-23, respectively. The lowest (0.50 and 0.52) and the highest (1.57 and 1.63) values of leaf area index (LAI) of brinjal were observed in the treatment T_1 (absolute control) and T_7 (100 % N through KAB fortified with 2 kg boron + 3 kg zinc ha^{-1}) treatment during the year 2021-22 and 2022-23; respectively.

At 90 Days After Transplanting (DAT). The data on leaf area index (LAI) showed variation from 0.47 to 1.25 and 0.49 to 1.26 during the years 2021-22 and 2022-23, respectively (Table 5). The lowest (0.47 and 0.49) and the highest (1.25 and 1.26) values of leaf area index (LAI) of brinjal were observed in the treatment T_1 (absolute control) and T_7 (100 % N through KAB fortified with 2 kg boron + 3 kg zinc ha^{-1}) treatment during the year 2021-22 and 2022-23, respectively. Further, the leaf area index (LAI) of brinjal at 90 DAT show a decreased LAI values (leaf area index) as compared to leaf area index (LAI) recorded at 60 DAT during the years 2021-22 and 2022-23.

Table 5: Effect of zinc and boron fortified briquettes on leaf area index (LAI) of brinjal.

Treatment No.	2021-22					2022-23				
	30 DAT	60 DAT	90 DAT	120 DAT	140 DAT	30 DAT	60 DAT	90 DAT	120 DAT	140 DAT
T_1	0.17	0.50	0.47	0.43	0.41	0.18	0.52	0.49	0.48	0.41
T_2	0.59	1.20	0.95	0.67	0.62	0.60	1.26	0.96	0.72	0.65
T_3	0.65	1.30	1.14	0.75	0.66	0.66	1.39	1.15	0.79	0.67
T_4	0.48	1.10	0.69	0.61	0.60	0.57	1.13	0.71	0.67	0.63
T_5	0.47	1.06	0.63	0.52	0.43	0.49	1.09	0.67	0.58	0.54
T_6	0.56	1.52	1.16	0.74	0.66	0.60	1.57	1.17	0.76	0.68
T_7	0.66	1.57	1.25	0.76	0.67	0.67	1.63	1.26	0.80	0.70
T_8	0.53	1.39	0.82	0.62	0.61	0.59	1.41	0.86	0.66	0.63
T_9	0.46	1.08	0.76	0.49	0.47	0.48	1.10	0.78	0.52	0.52

At 120 Days After Transplanting (DAT). The leaf area index (LAI) varied from 0.43 to 0.76 and 0.48 to 0.80 during the years 2021-22 and 2022-23, respectively. The lowest (0.43 and 0.48) and the highest (0.76 and 0.80) values of leaf area index (LAI) of brinjal were observed in the treatment T_1 (absolute control) and T_7 (100 % N through KAB fortified with 2 kg boron + 3 kg zinc ha^{-1}) during the year 2021-22 and 2022-23, respectively. Further, the leaf area index (LAI) of brinjal at 120 DAT decreased as compared to leaf area index (LAI) recorded at 90 DAT during the years 2021-22 and 2022-23.

At 140 Days After Transplanting (DAT). The value of leaf area index (LAI) ranged from 0.41 to 0.67 and 0.41 to 0.70 during the years 2021-22 and 2022-23, respectively (Table 5). The lowest (0.41 and 0.41) and the highest (0.67 and 0.70) values of leaf area index (LAI) of brinjal were observed in the treatment T_1 (absolute control) and T_7 (100 % N through KAB fortified with 2 kg boron + 3 kg zinc ha^{-1}) during the year 2021-22 and 2022-23, respectively. Further, the leaf area index (LAI) of brinjal at 140 DAT decreased as compared to leaf area index (LAI) recorded at 120 DAT during the years 2021-22 and 2022-23.

Leaf area index is one of the principal aspects influencing leaf net photosynthesis of the crops. The capacity of a leaf canopy to intercept light and fix carbon is measured by the leaf area index. LAI is mainly decided by the source strength. Compared with two nutrients, urea showed its supremacy on LAI might be due to nitrogen involvement in the vegetative growth compared to phosphorus source (Sivakumar and Srividhya 2018). Kumar (2016) found the LAI (Leaf Area Index) in the range of 4.34 to 4.92; the LAI influenced might be due to presence of optimum contents of various nutrients required by brinjal. LAI values successively increased due to advancement in the growth stages of crop up to 120 DAS and then it showed declining trend up to maturity stage of Ashwagandha. It is also apparent from the data that rate of increment in LAI values was most rapid during the period between 60 DAS to 120 DAS and thereafter it slowed down till the maturity as reported by Ahirwar *et al*. (2017).

Fruit and stover yield of brinjal: The data (Table 6) indicated that the application of zinc and boron fortified briquettes significantly influenced the fruit and stover yield of brinjal. The maximum values of fruit yield 31.43 and 31.99 t ha^{-1} were observed during the years 2021-22 and 2022-23, respectively. The application of 100 per cent nitrogen through Konkan Annapurna Briquettes fortified with 2 kg boron and 3 kg zinc ha^{-1} (T_7) registered the highest fruit yield of brinjal during both years of investigation. Whereas minimum values of fruit yield 11.08 and 11.14 t ha^{-1} were observed in the treatment of absolute control (T_1) for both the years. In first year, T_7 treatment showed at par results with T_3, T_6 and T_8 treatments while in second year T_7 treatment showed at par results with T_2, T_3, T_6 and T_8 treatments in terms of fruit yield.

The maximum values of stover yield 1.84 and 1.88 t ha^{-1} with a mean value of 1.42 t ha^{-1} and 1.50 t ha^{-1} were observed in the application of 100 per cent nitrogen through Konkan Annapurna Briquettes fortified with 2 kg boron and 3 kg zinc ha^{-1} (T_7) during both years of investigation. Whereas minimum values of fruit yield 0.93 and 0.95 t ha^{-1} were observed in the treatment of absolute control (T_1) for both the years. In first year, T_7 treatment showed at par results with T_2 and T_6 treatments while in second year T_7 treatment showed at par results with T_2, T_3, T_4, T_6 and T_8 treatments in terms of stover yield.

According to Kadam *et al*. (2017); Torane *et al*. (2017), application of fortified briquettes increased okra and cucumber yield, respectively. Kokare *et al*. (2015); Dademal (2018) also observed an increase in chilli yield as a result of nutrients delivered in the form of fortified briquettes. The possible reasons for increase in the fruit yield of brinjal. It might be due to the slow release of nutrients through micronutrient fortified KAB for the entire growth period of brinjal crop. This was reflected in terms of yield.

Table 6: Effect of zinc and boron fortified briquettes on fruit and stover yield of brinjal (t ha^{-1}).

Tr. No.	Treatment Details	*Rabi*, 2021-22		*Rabi*, 2022-23	
		Fruit Yield (t ha^{-1})	Stover yield (t ha^{-1})	Fruit Yield (t ha^{-1})	Stover yield (t ha^{-1})
T_1	Absolute control	11.08	0.93	11.14	0.95
T_2	RDF (150:50:50 N: P_2O_5 K_2O kg ha^{-1}) through straight fertilizers	26.61	1.77	27.57	1.79
T_3	100 % N through Konkan Annapurna Briquettes (KAB)	27.41	1.52	28.40	1.61
T_4	80 % N through Konkan Annapurna Briquettes (KAB)	21.93	1.40	22.56	1.57
T_5	60 % N through Konkan Annapurna Briquettes (KAB)	20.30	1.15	20.49	1.17
T_6	RDF + 2 kg boron + 3 kg zinc ha^{-1}	27.44	1.67	28.85	1.71
T_7	100 % N through KAB fortified with 2 kg boron + 3 kg zinc ha^{-1}	31.43	1.84	31.99	1.88
T_8	80 % N through KAB fortified with 2 kg boron + 3 kg zinc ha^{-1}	27.67	1.37	27.94	1.55
T_9	60 % N through KAB fortified with 2 kg boron + 3 kg zinc ha^{-1}	22.30	1.16	22.64	1.24
Mean		**24.02**	**1.42**	**24.62**	**1.50**
SE(m) ±		**1.37**	**0.10**	**1.67**	**0.12**
C. D. @ 5%		**4.12**	**0.30**	**5.01**	**0.35**

The highest stover yield was recorded in T_7 (100 % N through KAB fortified with 2 kg boron + 3 kg zinc ha^{-1}) it might be due to better extraction of nutrients supplied through micronutrient fortified KAB briquettes. Similar findings were also observed by Torane (2014) in cucumber, Kokare *et al*. (2015) and Dademal (2018) in chilli

Economics of brinjal: The data on mean cost of cultivation, gross and net returns and benefit cost ratio as influenced by different treatments are presented in Table 7. The maximum cost of cultivation recorded in treatment T_7 (100 % N through KAB fortified with 2 kg boron + 3 kg zinc ha^{-1}). Application of fertilizers in the form of briquettes recorded highest gross returns Rs. 1100050 and Rs. 1119650 and returns of Rs. 580313 and Rs. 596646 with B:C ratio of 2.12 and 2.14 during 2021-22 and 2022-23, respectively. The lowest value of working cost of cultivation, gross and net returns and benefit cost ratio were recorded to the tune of Rs. 284316 & Rs. 284666, Rs. 387800 & Rs. 389900, Rs. 103484 & Rs. 105234, and 1.36 & 1.37 with absolute control with exclusion of any fertilizer application during 2021-22 and 2022-23, respectively.

Table 7: Influence of zinc and boron fortified briquettes on economics of brinjal.

Tr. No.	Yield (t ha^{-1})		Input cost (Rs.)	Total cost (Rs.)		Gross Returns (Rs.)		Net returns at total cost (Rs.)		B:C ratio at total cost	
	2021-22	2022-23		2021-22	2022-23	2021-22	2022-23	2021-22	2022-23	2021-22	2022-23
T_1	11.08	11.14	193170	284316	284666	387800	389900	103484	105234	1.36	1.37
T_2	26.61	27.57	280229	473284	478884	931350	964950	458066	486066	1.97	2.01
T_3	27.41	28.40	288983	487843	493618	959350	994000	471507	500382	1.97	2.01
T_4	21.93	22.56	285821	452303	455978	767550	789600	315247	333622	1.70	1.73
T_5	20.30	20.49	282658	439220	440329	710500	717150	271280	276821	1.62	1.63
T_6	27.44	28.85	285978	484621	492846	960400	1009750	475779	516904	1.98	2.05
T_7	31.43	31.99	296456	519737	523004	1100050	1119650	580313	596646	2.12	2.14
T_8	27.67	27.94	291799	492541	494116	968450	977900	475909	483784	1.97	1.98
T_9	22.30	22.64	287141	455953	457936	780500	792400	324547	334464	1.71	1.73

Note:

Details of prices used for cost of cultivation of brinjal experiment: Labour charges: 300 day^{-1}, Seedling Material: 80 Rs. 100^{-1} seedlings, Field Preparation tractor: 800 Rs. hr^{-1}, FYM: 4000 Rs. t^{-1}, Konkan Annapurna Briquettes: 35 Rs. kg^{-1}, Konkan Annapurna Briquettes fortified with zinc and boron: 48 Rs. kg^{-1}, Borax: 250 Rs. kg^{-1}, Zinc Sulphate: 80 Rs. kg^{-1}, Lambda Cyhalothrin 810 Rs. lit^{-1}, Trichoderma: 250 Rs. kg^{-1}, Dithane M-45: 200 Rs. kg^{-1} and Brinjal Fruits Price: 35 Rs. kg^{-1}.

CONCLUSIONS

From present investigation, it can be concluded that use of zinc and boron fortified Konkan Annapurna Briquettes (KAB) application of brinjal 150% NPK + FYM recorded significantly higher growth and fruit yield. Treatment T_7 (100 % N through KAB fortified with 2 kg boron + 3 kg zinc ha^{-1}) was found to be statistically at par with T_8 (80 % N through KAB fortified with 2 kg boron + 3 kg zinc ha^{-1}) which was also recorded with higher benefit-cost ratio. Therefore, 80 % N through KAB fortified with 2 kg boron + 3 kg zinc ha^{-1} was found to be suitable for realizing optimum brinjal fruit yield. Hence, it is recommended for brinjal growers in Konkan region to ensure sustainability in crop production as well as maintaining soil health.

FUTURE SCOPE

The future research may be taken up with fortification of other micro as well as secondary macronutrients with NPK briquettes in lateritic as well as other soils of Maharashtra.

Acknowledgement. I express my gratitude to the Department of Soil Science and Agricultural Chemistry, Dr. Balasaheb

Sawant Konkan Krishi Vidyapeeth, Dapoli for providing necessary equipment's, laboratory for analysis and other basic infrastructure.

Conflict of Interest. As a Corresponding Author, I Sagar S. Patil, confirm that none of others have any conflicts of interest associated with publication.

REFERENCES

Agren, G. I. (1985). Theory for growth of plants derived from nitrogen productivity concept. *Physiologia plantarum, 64*, 17–28.

Ahirwar, S. K., Agrawal, K. K. and Kushwaha, H. S. (2017). Growth analysis and phenological parameters of ashwagandha (*Withania somnifera* L.) In intercropped with pulses and oilseeds. *Plant Archives, 17*(2), 1093-1098.

Anonymous, (2022a). https://pib.gov.in/PressReleasePage.aspx?PRID=1841480

Anonymous, (2023). http://www.indiastatagri.com/table/Maharashtra-state/brinjal/selected-state-wise-area-production-productivity-b/1442043.

Blackman, V. N. (1919). The compound interest law and plant growth, *Annals of Botany, 33*, 353-360.

Bose, U. S. and Tripathi, S. K. (1996). Effect of micronutrients on growth, yield and quality of Tomato cv. Pusa Ruby in M. P. *Crop Research Hissar, 12*(2), 61-64.

Briggs, C. E., F. Kidd and Waat, C. (1921). A quantitative analysis of plant growth, *Annals of Applied Biology, 7*, 202.

Bulbule, A. V., Patil, V. S. and Jangale, G. D. (2005). Efficient fertilizer management through deep placement as briquettes for lowland rainfed transplanted rice. *Journal of Maharashtra Agricultural Universities, 30*(3), 259-267.

Dademal, A. A. (2018). Effect of micronutrient fortified Konkan Annapurna Briquettes (KAB) on chilli (*Capsicum annum* L.) in lateritic soils of Konkan. *Ph.D.* (*Agri*) *Thesis* submitted to Dr. B. S. K.K.V., Dapoli, Dist. Ratnagiri, Maharashtra (unpub.).

Dubey, R., Sharma, D., Trivedi, J., Shrivastava, L. K. and Gupta, P. (2023). Effect of integrated nutrient management on physiological parameters in French bean. *The Pharma Innovation Journal, 12*(3), 3387-3390.

Ghule, P. L., V. V. Dahiphale, Jadhav, J. D. and Palve, D. K. (2013). Absolute growth rate, relative growth rate, net assimilation rate as influenced on dry matter weight of Bt cotton. *International Research Journal of Agricultural Economics and Statistics, 4*(1), 42-46.

Gregory, P. J., Kidd, G. E. and West, C. (1917). *Growth analysis. Introductory plant physiology* (eds. Noggle, G. R. and Fritz, W.). Prentice Hall, New Delhi, 600.

Hatwar, G. P., Gondane, S. M., Urkade, S. M. and Gahukar, O. V. (2003). Effect of micronutrients on growth and yield of chilli. *Journal Soils and Crops, 13*(1), 123-125.

Kokare, V. G., Kasture, Ms. C., Palsande, V. N. and Mhalshi, R. M. (2015). Effect of different fertilizer briquettes and organic manures on yield, nutrients uptake and chemical properties of soil in chilli (*Capsicum annuum* L.) In lateritic soils of Konkan. *International Journal of Agricultural Science and Research, 5*(2), 13-18.

Kulkarni, M. G., Glendon, D. Ascough, and Johannes, V. S. (2007). Effects of foliar applications of smoke-water and a smoke-isolated butenolide on seedling growth of okra and tomato. *HortScience, 42*(1), 179–182.

Mallic, M. F. R. and Muthukrishnan, C. R. (1979). Effect of micronutrients on tomato (*Lycopersicon esculentum* Mill.). 1: Effect on growth and development. *South Indian Horticulture, 27*, 121-124.

Nkansah, G. O., Amoatey, C., Zogli, M. K., Nketia, S., Ofori, P. A. and Agyemang, F. (2021). Influence of topping and spacing on growth, yield, and fruit quality of tomato (*Solanum lycopersicum* L.) under greenhouse condition. *Frontiers in Sustainable Food Systems, 5*, 1-12.

Nongkhlaw, R. B., Bijaya Devi, A. K., Singh, K. J., Singh, N. O. and. Singh, S. J. (2021). Effect of different levels of nitrogen and potassium on physiological characters of sweet potato [*Ipomoea batatas* (L.) Lam.] cv. NFSP-1. *The Pharma Innovation Journal, 10*(1), 645-652.

Rawat, P. S. and Mathpal, K. N. (1984). Effect of micronutrients on yield and sugar metabolism of some of the vegetables under Kumaon hill conditions. *Science and Culture, 50*, 243-244.

Sharma, Kalpana, Singh, S. P., Rawat, G. S., Gaur, Dhakad, H., Sharma, S. K. and Joshi, E. (2019). Effect of different cropping systems and fertility levels on quality and physiological parameters of potato. *Journal of Pharmacognosy and Phytochemistry, 8*(6), 2294-2299.

Shubha, A. S, Srinivasa V., Devaraju, Shivaprasad, M., Nandish, M. S., Lavanya, K. S., Yogaraju, M. and Shanwaz, A. (2019). Effect of integrated nutrient management on growth, yield and economics of potato (*Solanum tuberosum* L.) under hill zone of Karnataka. *The Pharma Innovation Journal, 8*(5), 714-718.

Tapkeer, P. B., Kasture, M. C. and Kadu, J. B. (2017). Effect of different fertilizer briquettes on yield, nutrient uptake and soil fertility status of Dolichos bean (*Dolichos lablab* L.) in lateritic soils of Konkan. *International Journal of Chemical Studies, 5*(4), 367-371.

Torane, H. B., Kasture, M. C., Kokare, V. G., and Sanap, P. B. (2017). Effect of bio–degradable coated fertilizer briquettes and their application time on growth, yield, and nutrient content on soil properties of cucumber in lateritic soil of Konkan Maharashtra. *International Journal of Chemical Studies, 5*, 27-32.

Watson, D. J. (1947). Comparative physiological studies on the growth of field crops. I. Variation in net assimilation rate and leaf area between species and varieties and within and between years. *Annals of Botany, 11*, 41-76.

Watson, D. J. (1958). The dependence of net assimilation rate on leaf area index. *Annals of Botany, 22*, 37-54.

Williams, R. E. (1946). The physiology of plant growth with special reference to the concept of NAR. *Annals of Botany, 10*, 47-71.

How to cite this article: Patil S.S., Dodake S.B., Kasture M.C., Sanap P.B., More V.G. and Vaidya K.P. (2023). Growth and Yield of Brinjal as influenced by Zinc and Boron fortified Briquettes in Lateritic soils of Konkan. *Biological Forum – An International Journal, 15*(10): 1623-1631.