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Effect of organic and inorganic fertilizers on growth, yield and quality of palak (*Beta vulgaris* L.) var. PUSA JYOTI

M.B. DANGE, A.M. BHOSALE AND S.R. BARKULE

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SUMMARY

An experiment was conducted on palak (*Beta vulgaris* L.) var. PUSAJYOTI to study the effect of organic and inorganic fertilizers on growth, yield and quality of palak. Results revealed that treatment of 50% RDF + 50 % N through poultry manure gave best results of growth in terms of height of plant, number of leaves, leaf area per plant, length of petiole at all stages of growth, yield in terms of yield per plant, per plot and yield per hectare and quality parameters in terms of dry matter, iron content and fibre content.

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Key words : Organic and inorganic fertilizers, Yield, Palak, Vermicompost, FYM

Indian spinach (*Beta vulgaris* L.) is one of the most important leafy vegetable consumed all over the country. It is commonly known as "palak". The edible portion of palak consists of compact rosette of leaves prior to the stock formation. To increase the yield and quality of vegetables, it is not possible to completely eliminate the use of chemicals especially fertilizers. Therefore, use of FYM, compost, vermicompost, poultry manure and other organic manure coupled with chemical fertilizers in 21st century, for sustainable production is necessary by way of integrated use of nutrients. There is little work has been reported on effect of organic fertilizers or in combination with inorganic fertilizers, therefore, an experiment entitled Effect of organic and inorganic fertilizers on growth, yield and quality of palak (*Beta vulgaris* L.) var. PUSA JYOTI was undertaken to find out level of substitution of inorganic fertilizers with different organic manure for palak and to study the effect of the level of substitution of inorganic fertilizers with different organic manure on growth, yield and quality of palak.

MATERIALS AND METHODS

The present study was conducted during *Rabi* season of 2005-06 at Department of Horticulture, Marathwada Agricultural University, Parbhani (M.S.). The experimental site was having well leveled and uniform with medium black soil having uniform texture and good drainage. The experiment was laid out in Randomized Block Design and consisted of eight treatments and three replications. The treatment details are as below.

Tr.No. Treatments

T_1 100 % RDF

T_2 75 % RDF + 25 % N through vermicompost

T_3 50 % RDF + 50 % N through vermicompost

T_4 75 % RDF + 25 % N through poultry manure

T_5 50 % RDF + 50 % N through poultry manure

T_6 75 % RDF + 25 % N through FYM

T_7 50 % RDF + 50 % N through FYM

T_8 Control

The 100:50:50 Kg NPK/ha was considered as RDF and 1.6 t/ha poultry manure, 5.00 t/ha vermicompost and 10 t/ha FYM was considered as standard dose. The inorganic fertilizers were added in the form of urea, single super phosphate and murate of potash. The seed was sown at the spacing of 15 x 10 cm. The green leaves were harvested after 30, 45, 60, 75 and 90 days after sowing (DAS) as per treatment at 5 cm above from soil surface. The observations were recorded at 15 days interval from 30 days till 90 days after sowing. The growth observations were recorded on plant height, number of leaves, leaf area and length of petiole. Yield observations were recorded on yield per plant, per plot and per hectare. The quality observations were recorded after third cutting at 60 days after sowing.

Correspondence to:
A.M. BHOSALE, Custard Apple Research Station, Ambajogai, BEED (M.S.) INDIA

Authors' affiliations:
M.B. DANGE, Department of Horticulture, Marathwada Agricultural University, PARBHANI (M.S.) INDIA

S.R. BARKULE, Department of Horticulture, College of Agriculture, Ambajogai, BEED (M.S.) INDIA

RESULTS AND DISCUSSION

The findings of the present study as well as relevant discussion have been summarized under following heads:

Vegetative growth:

Plant height :

Data presented in table 1 revealed that at 30 days after swing (DAS) and at 60 DAS treatment T_5 (50% RDF + 50 % N through poultry manure) exhibited significantly more plant height (25.35 and 29.92 cm, respectively) than control and most of the treatments. The better height of plant might be due to better development and branching of roots which help in uptake of nutrient as well as more availability of nutrients. These findings are in similar line with the findings of Borekar (2000).

Number of leaves :

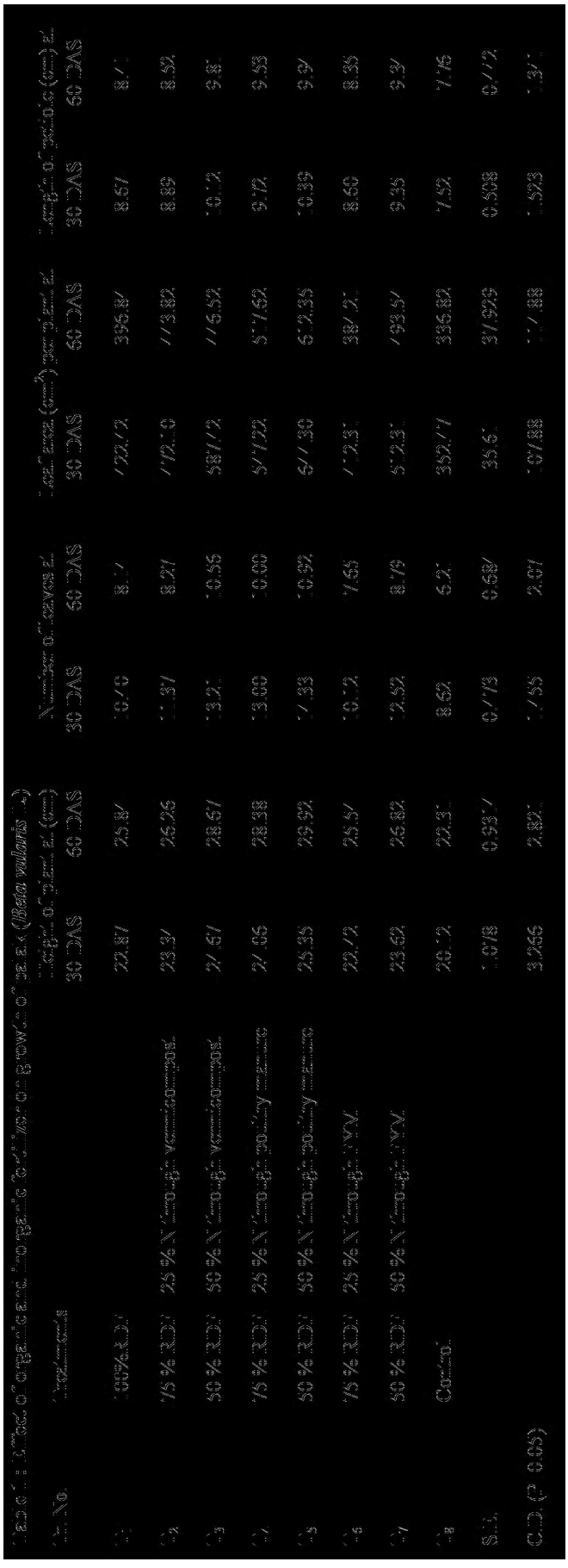
The data presented in Table 1 indicated that at the stage of 30 DAS and at 60 DAS significantly more number of leaves were recorded in treatment T_5 (50 % RDF + 50 % N through poultry manure) *i.e.* 14.33 and 10.92 which was significantly superior over control and most of the other treatments. These effects could be attributed to solubalization effect of plant nutrients as well as chelating effects on metal ions leading to subsequent uptake of NPK by plant (Subbiah *et al*., 1982) The results obtained in the present study are supported by the findings of Subbaih *et al.* (1982), Subhan (1988) and Yadav and Yadav (2002) in onion.

Leaf area per plant :

The data on leaf area per plant presented in Table 1 indicated that at 30 DAS and 60 DAS, significantly more leaf area per plant (644.30 and 612.35 cm^2, respectively) was recorded in treatment T_5 over control. This effect might be due to increase in dry matter production during the growth stages due to availability of sufficient nutrient in soil through out growing period due to application of organic manure. Similar results were obtained by Khullar and Chahal (1978) in brinjal, Kendre (1993) in cabbage.

Length of petiole :

Table 1 revealed that at 30 DAS and 60 DAS treatment T_5 (50 % RDF + 50 % N through poultry manure) produced significantly more length of petiole (10.39 cm and 9.94 cm, respectively) over treatment T_1, T_6 and T_8. The increase in petiole length with application of organic source might be due to increased availability of nutrients (major as well as minor) accelerated growth. These results are in accordance with Subbarao and



Ravishankar (2001) in brinjal.

Yield parameters :

Green yield per plant and per plot :

Data presented in Table 2 indicated that there were significant differences in respect of yield per plant (47.65 g) and per plot (11.91 kg) recorded in treatment T_5 (50 % RDF + 50 % N through poultry manure) which was significantly superior over treatments T_6 and T_8. Application of organic manure might have significantly enhanced the availability of native and applied macro and micro nutrients in soil, as a consequences of which leaf area per plant and per plot would have increased. The increase in yield due to addition of organic manure has been reported by Sharma and Sharma (1988) in potato, Natrajan (1990) in Chilli.

Green Yield per hectare (q) :

The data presented in Table 2 revealed that maximum leaf yield per hectare was recorded in treatment T_5 (50 % RDF + 50 % N through poultry manure) (315.07 q) which was statistically superior over T_6 and T_8. The factors which reflects on yield significantly improved with the addition of organic manure. The beneficial role of added organic manure in improving physical, chemical and biological properties of soil is well known, which in turn helps in better nutrient absorption by plant and resulting into higher yield. Such beneficial effect of added organic manuring have been established by Jeevanjothi *et al.* (1993) in cabbage and Shelke *et al.* (1999) in brinjal.

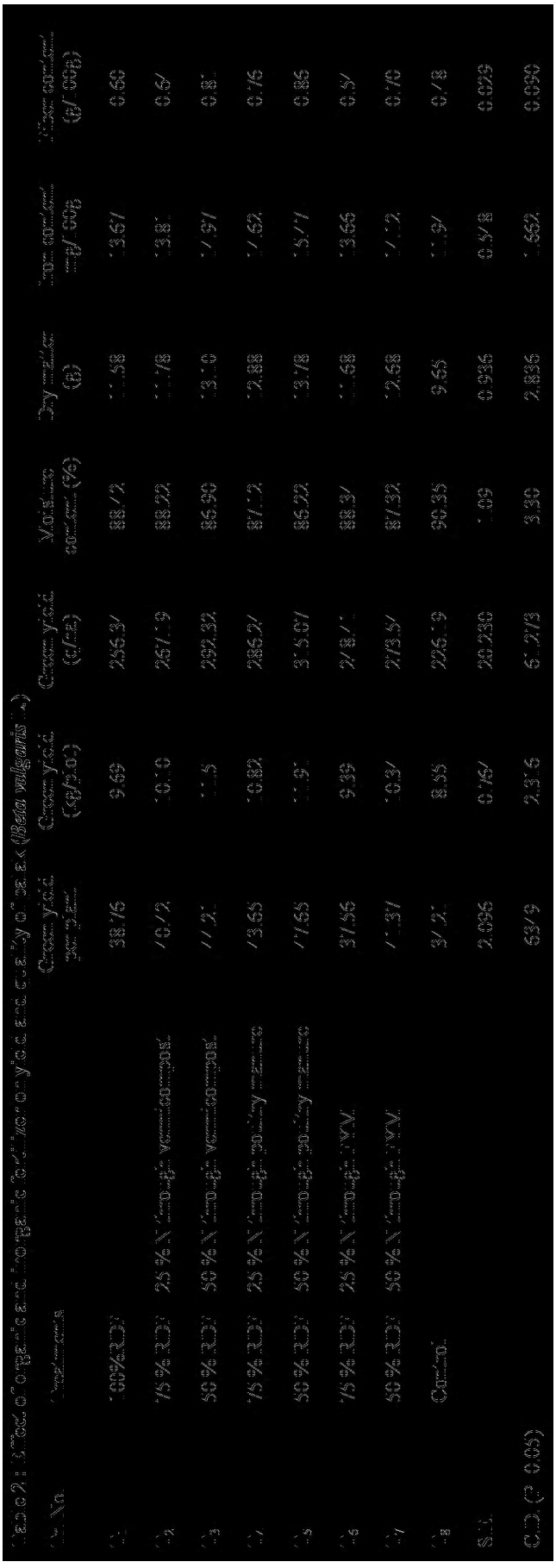
Quality parameters:

Moisture content :

Table 2 clearly indicated that significantly lowest moisture content (86.22 %) was recorded under treatment T_5 (50 % RDF + 50 % N through poultry manure) which was significantly superior over treatments T_2, T_6 T_1 and T_8. Where as significantly highest moisture content was noticed in control. The lower moisture content in treatment receiving combination of inorganic fertilizers and organic manure might be due to higher dry mater accumulation, as a result of increased photosynthetic activity and aviability of macro and micro nutrients. These results are in similar line with the findings of Karadkhelkar (1985) in Spinach.

Dry matter :

Table 2 revealed that maximum value for dry matter (13.78 g) was observed in treatment T_5 (50% RDF + 50 % N through poultry manure), which was significantly superior over T_8. The application of organic manures in



combination with inorganic fertilizers found to be more beneficial in increasing dry weight of plant as compared to inorganic fertilizer alone. This seems to be better production and utilization of dry matter by the plant due to organic source of manure having the rich source of humus matter, nitrogen fixation by microbes, regulation of nitrogen supply to the plants and production of plant growth promoters as reported by Krishnamurthy and Ravikumar (1973).

Iron content :

Table 2 revealed that maximum iron content in palak leaves (15.47 mg/100g) was recorded in the treatment T_5 (50 % RDF + 50 % nitrogen through poultry manure) which was significantly superior over treatments T_1, T_6 and T_8. The increase in iron content of palak leaves might be due to increased availability and uptake of iron by plant. These finding are in similar line with Takagi and Shiroshi (1972) and Karadkhelkar (1985) inspinach

Fibre content :

Table 2 showed that maximum fibre content (0.86 g/100g) was observed in treatment T_5 (50 % RDF + 50 % N through poultry manure) which was significantly superior over all other treatments except T_3. These findings are in agreement with Schupan (1974) in Spinach.

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