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# INFLUENCE OF MOTHER CROP NUTRITION ON YIELD AND QUALITY OF CARROT SEEDS

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**ABSTRACT**

Studies carried out with three doses of NPK fertilizers revealed that 150 : 75 : 150 kg NPK $ha^{-1}$ enhanced the yield of quality seed by improving the number of umbles $plant^{-1}$ and seed yield $umbel^{-1}$. It also increased the protein content and weight of seed. However, it did not improve the physiological quality of seed such as germination percentage and vigour. For production of better quality seed the above NPK dose can be adopted.

KEY WORDS : Carrot, steckling, sprouting, bolting, umbel order, seed yield, germination

Success of any crop is normally influenced by the genetic, edaphic and environmental factors during crop growth. The world wide truth of macro nutrient application for maximising crop production has its own diversion due to their amenability to varying doses depending on the crop. The quantum of macronutrient application need to be fixed for each and every crop especially to seed crop which required higher doses than the normal dose for commercial crop. Studies were taken up in carrot cv.*zino* for optimising the doses of NPK for production of better quality seeds.

## MATERIALS AND METHODS

The material used for seed production was carrot steckling. Stecklings of almost uniform size weighing 150 - 200 g were selected and a field trial was conducted at Horticultural Research Station, Udhagamandalam, The Nilgiris during 1993-94, in Randomised Block Design with eight replication. The nutrient doses adopted were 50 : 25 : 50 kg $ha^{-1}$, 100 : 50 : 100 kg $ha^{-1}$ and 150 : 75 : 150 kg NPK $ha^{-1}$ in the form of urea, single super phosphate and muriate of potash. Full dose of P and K and half dose of N were applied as basal and the remaining N was applied in 2 split doses ; one at bolting and the other at flowering. A spacing of 75 x 75 cm was adopted with uniform agronomic practices for all treatments.

At the onset of reproductive phase, days to sprouting of steckling, days to umbel emergence and distribution of umbels $plant^{-1}$ were recorded on five selected plants and continued observations on seed yield $umbel^{-1}$, distribution of seed yield $plant^{-1}$, seed yield $plant^{-1}$ and seed yield $plot^{-1}$. 1000 seed weight was recorded on eight replications. After debristling, the seeds were subjected to soaking and draining treatment with water at 24 h interval and repeated thrice. Seed quality parameters such as germination (Anon, 1985), root length, shoot length and dry weight of seedlings were recorded. The vigour index was computed (Abdul - Baki and Anderson, 1973) and the protein content of the seeds estimated (Alikhan and Youngs, 1973).

## RESULTS AND DISCUSSION

Except of the days to sprouting of steckling all the growth and yield attributing characters revealed highly significant variation owing to mother crop nutrition. Days to umbel emergence and total number of umbels $plant^{-1}$ increased with increasing doses of NPK (Table 1). This increase in number of umbels $plant^{-1}$ might be due to the greater chlorophyll synthesis under higher N application which helped in increasing branching of plant for formation of umbel orders. In Asiastic turnip increased plant size and branches was pointed out to the application of additional N by Sandhu *et al.*, (1965). Asif and Greig (1972) also reported that plant height can be increased by N application to soil.

Distribution of secondary and tertiary umbels had direct relationship with increased application

**Table 1. Influence of nutrient levels on days to sprouting of stecklings, days to umbel emergence, total number of umbels and seed yield in carrot *cv.zino***

| Fertilizer schedule (NPK kg $ha^{-1}$) | Days to sprouting of steckling | Days to umbel emergence | Total number of umbels $plant^{-1}$ (g) | Total seed yield $Plot^{-1}$ (kg) | Total seed yield |
|---|---|---|---|---|---|
| $F_1$ 50 : 25 . 50 | 6 | 92 | 58 | 42.8 | 759 |
| $F_2$ 100 : 50 : 100 | 6 | 83 | 67 | 52.8 | 939 |
| $F_3$ 150 : 75 : 150 | 5 | 74 | 71 | 53.7 | 955 |
| CD (P = 0.05) | NS | 1.93 | 4.84 | 1.94 | 42.01 |

**Table 2. Influence of nutrient levels on distribution of umbels in carror *cv.zino***

| Fertilizer schedule (NPK kg $ha^{-1}$) | Primary umbel | Secondary umbel | Tertiary umbel | Other umbels | Mean |
|---|---|---|---|---|---|
| $F_1$ 50 : 25 : 50 | 1 | 13.0 | 30.5 | 14.3 | 14.7 |
| $F_2$ 100 : 50 : 100 | 1 | 15.3 | 34.0 | 16.3 | 16.7 |
| $F_3$ 150 : 75 : 150 | 1 | 15.0 | 38.0 | 17.8 | 17.9 |
| Mean | 1 | 14.5 | 34.2 | 16.0 | |
| | | (F : Fertilizer ; U - Umber order) | | | |
| | F | U | FxU | | |
| CD (P = 0.05) | 1.42 | 1.64 | 2.84 | | |

**Table 3. Influence of nutrient levels on seed yield and quality in carrot *cv.zino***

| Nutrient levels | Seed Yield $Umbel^{-1}$ (g) | Seed Yield $Plant^{-1}$ (g) | 1000 Seed Weight (g) | Germination (%) | Vigour Index |
|---|---|---|---|---|---|
| $F_1$ | 2.81 | 10.72 | 1.59 | 56 (48.32) | 636 |
| $F_2$ | 3.13 | 12.99 | 1.62 | 56 (48.48) | 658 |
| $F_3$ | 3.21 | 13.25 | 1.63 | 56 (48.27) | 662 |
| Mean | 3.05 | 12.32 | 1.62 | 56 (48.36) | 652 |

(Figures in parenthesis are indicates aresin values)

of NPK, owing to the synthesis of more carbohydrates which is better utilised to form more protoplasm which promote cell division and thereby results in increased diameter of reproductive shoots (Sharma and Kanuajia, 1992) (Table 2).

The positive trend in the formation of more number of secondary and tertiary umbel orders with increased application of NPK, enhanced further the seed yield $umbel^{-1}$, distribution of seed yield $plant^{-1}$ and seed yield $plant^{-1}$ (Table 3). The seed yield was higher in plots applied with NPK @ 150 : 75 : 150 kg $ha^{-1}$ might be due to higher photosynthetic activity which was directed to development of seeds (Nazeer - Ahmed and Tanki, 1988). The added advantage of additional macronutrients in increasing the productivity of a seed crop is also reported by Malik and Kanwar (1969) and Malik (1973) in carrot, Sandhu *et al.* (1965), Chakrabarti *et al.* (1979), Singh *et al.* (1981) in radish and Asif and Greig (1972) in okra.

High doses of NPK not only increased the yield and yield attributing characters but also 1000 seed weight and protein content of the seed. The quality characters of seed in terms of germinability and vigour status, however did not influenced by any of the given nutrition (Table 3).

Hence it can be concluded that the fertilizer schedule of 150 : 75 : 150 kg NPK $ha^{-1}$ can be practiced for the production of quality seed in carrot *cv.zino*

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# STANDARDIZATION OF LOAD OF BIOINOCULANT IN PEARLMILLET UNDER DRYLAND CONDITIONS

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## ABSTRACT

Field trial was conducted to study the response of pearlmillet to differnt loads of bioinoculants on vertisol for six years in dryland conditions. Dual inoculation of *Azospirillum lipoferum* and *Azotobacter chroococcum* at optimum load of inoculum i.e. 60 g/kg seed performed economically well in respect of plant height, 1000 grain weight, Nitrogen uptake besides grain and stover yields over their individual inoculaiton at recommended dose i.e. 30 g/kg seed. More cost benefit ratio and additional net income was recorded by 60 g/kg seed treatment as compared to recommended dose of bioinoculant.


KEY WORDS : Load of bioinoculant, pearlmillet, dryland

Pearlmillet seed inoculation with bio-inoculant is now a days included in package of practice, because, bioinoculants have an important role to play in improviong the nutrient supplies and their crop availability in dryland crop production. Increase in pearlmillet production due to use of bioinoculant in dryland have been reported by many research workers viz., Jadhav, et.al. (1994) Laura, et.al, (1994), Subba Rao (1986), Wani, et.al. (1988) and Wani (1990). Farmers from the drought prone area of Maharashtra says that, some time, no increase in pearlmillet production was observed even after treating seed with bioinoculant as per recommendation i.e. 30 g/kg seed. This may happen due to dry spells, normally experienced during late July and August which is a characteristic feature of drought prone area of Maharashtra (Patil, et.al. 1981)

Katyal, et.al. (1994) reported that in dryland response to biofertilizer varied with crops, host cultivars, locations, seasons, agronomic practices, bacterial strains, soil fertility and interaction with native soil microflora. Mulder et.al. (1977) reported that biological nitrogen fixation is often influenced by soil moisture, organic matter content, soil air, and soil temperature. It was, therefore, thought necessary to increase the load of inoculum on seed, so that, some active Nitrogen fixing bacteria will remain in the rhizosphere of the pearlmillet even under adverse soil conditions. Hence, it was decided to determine the amount of inoculum required to derive the maximum benefit and thereby increase in pearlmillet production in drought prone area of Maharashtra

## MATERIALS AND METHODS

The trial was conducted during *kharif* seasons continuously for six years from 1989 to 1994 at Dry Farming Research Station, Solapur in vertisol having pH - 7.7, Organic carbon - 0.34 %, Available N - 139, $P_2O_5$ - 11.6 and $K_2O$ - 628 kg/ha. Three replication for each treatment were arranged in a factorial randomised block design with gross and net plot size of 4.50 x 3.60 $m^2$ and 4.10 x 2.79 $m^2$ respectively. The main treatments of bioinoculants included seed treatment with *Azospirillum lipoferum* ($B_1$), *Azotobactor chroococcum* ($B_2$), and *Azospirillum + Azotobactor*