Karnataka J. Agric. Sci., 21 (1), (115-117): 2008

Influence of Nutrition and Growth Regulators on Fruit, Seed Yield and Quality of Pumpkin cv. Arka Chandan

Cucurbitaceae is one of the largest family in vegetable kingdom consisting of largest number of edible type species. Pumpkin (Cucurbita moschata Poir.) is one such important vegetable belongs to family Cucurbitaceae . Pumpkin fruits are extensively used as vegetables both in immature and mature stage. The yellow and orange fleshed fruits are very rich in carotene (3,332 IU), which is precursor of Vitamin-A with fair quantities of vitamins B and C (Prem Nath et al., 1973). In modern agriculture, chemical fertilizers constitute the major portion of total cost of seed production. As the cultivation of pumpkin is fast expanding, the growers often come across one or the other problems that limit its fullest expressions of growth and productivity. Hence, these problems could be overcome partially or completely by using different agrochemicals like mineral nutrients and growth regulators. The optimum doses of nitrogen, phosphorus and potassium vary greatly with the length of growing season, fertility status of soil, soil type, cultivar, geographical location and the environmental factors. These factors will have marked effect on the growth and yield parameters of pumpkin.

Plant growth regulators, a new generation of agrochemicals, when added in small amounts, modify the natural growth right from seed germination to senescence in crop plants. Among them, the use of GA_3, NAA and Ethrel is of considerable interest in different fields of agriculture and horticulture. Studies conducted elsewhere indicated the beneficial effects of chemical fertilizers and growth regulators on crop growth, fruit yield, seed yield and seed quality aspects in cucurbitaceous crops. Therefore, there is a urgent need to generate precise information with regard to requirement of optimum doses of chemical fertilizers and appropriate stage of spray with suitable growth regulators which help in better growth habit, fruiting and seed yield combined with better quality. Considering all these points in view an attempt has been made to find out the effect of chemical fertilizers and growth regulators on crop growth, seed yield and quality of pumpkin cv. Arka Chandan

The field experiment was conducted at Main Agricultural Research Station, Saidapur Farm, University of Agricultural Sciences, Dharwad during kharif season 2005 and the laboratory studies were made in the Department of Seed Science and Technology, University of Agricultural Sciences, Dharwad, Karnataka (India). The soil of the experimental site was red soil and well fertile and free from perennial weeds. The breeder seeds of pumpkin cv. Arka Chandan was obtained from Breeder Seed production unit ,IIHR,Hessarghata, Bangalore. The field experiment consisted twelve treatment combinations involving three inorganic fertilizer treatments viz: F_1:100:40:40, F_2: 125:50:50 and F_3:150:60:60 kg NPK per ha and three growth regulator sprays viz:G_1:Ethrel 200 ppm,G_2: 25 ppm G_3:NAA 100ppm and control (water spray). The field experiment was conducted in split plot design and replicated three times. The growth regulator spray was given at 2-4 leaf stage (22-25 days after sowing) and water was sprayed on the vines as control at the same time . The observations on number of fruits per vine , number of seeds per fruit, seed yield per fruit, per vine , per plot, per ha, and seed quality parameters such as 100 seed weight (g) seed germination and field emergence were recorded.

The data on seed yield and quality are presented in table 1 and 2. In the present investigation, higher seed yield per ha (541.0 kg) was recorded at the fertilizer level of 150:60:60 kg NPK per ha followed by F_2 (125:50:50 kg NPK per ha) and F_3 (100:40:40 kg NPK per ha) which recorded 379.0 kg per ha and 284.0 kg per ha, respectively. The higher seed yield in F_3 (150:60:60 kg NPK per ha) recorded could attributed to higher number of fruits per vine(2.18) ,seed yield per plot (1603.0 g), seed yield per vine (81.11 g), seed yield per fruit (36.40 g) and number of seeds per fruit (384.0) followed by F_2 and F_1 as (1176.87g, 56.65 g, 28.92 g, 337.47 and 836.99 g, 42.65 g, 29.84g and 318.88) respectively. The higher yields were probably responsible for better development of fruit, increased uptake of nutrients in the plants leading to enhanced chlorophyll content and carbohydrate synthesis, higher accumulation of photosynthates and their distribution to the developing ovules. The results are in conformity with findings of Aiyellagbe and Kintomo (2002), Ali et al. (1999) in pumpkin, Pandita and Randawa (1999)in Muskmelon, Lal (1992) and Shishidhara (2000) in chilli.

Foliar spray with ethrel (200 ppm) recorded significantly higher seed yield of 524.0 kg per ha followed by NAA at 100 ppm (471.0 kg per ha) and lowest yield at control (265.0 kg per ha). This could be due to more number of fruits (2.87 per vine).The auxins are known to cause physiological modifications in plants mainly on flowering behavior, sex ratio, increased fruit set, enlargement and development of fruits, source-sink relation and growth regulators bring certain changes in metabolism during fruit and seed development due to which there would be greater accumulation of food reserves resulting in higher seed yield. These beneficial effects of chemicals were also reported by Das and Das (1995) in pumpkin, Sitaram et al. (1988, 1989) and Rafeekher et al. (2002) in cucumber, Gedam et al. (1998) in bitter gourd and Balaraj (1999) in chilli. The seed germination did not differ with application of fertilizer, whereas field emergence differed significantly. Application of higher dose of fertilizers (150:60:60 kg NPK per ha) registered higher field emergence (89.8%) and lower values were with the treatment receiving of 100:40:40 kg NPK per ha.The seed quality parameters did not differ due to foliar spray of growth regulators. However, maximum germination per cent of 92.0 was recorded at GA_3 25 ppm, which was on par with other treatments and minimum values of germination was recorded by control (89%). The beneficial effect of these chemicals may be ascribed to certain changes in metabolism which helped in better seed development, greater accumulation of food reserves resulting in higher quality seeds.

*Part of M. Sc. (Agri.) thesis submitted by the senior author to the University of Agriculutral sciences, Dharwad - 580 005, India

Table -1 : Influence of nutrition and growth regulators on fruit and seed yield in pumpkin Cv.Arka Chandan

Treatments	Number of fruits per vine	Number of seeds / fruit	Seed yield / fruit(g)	Seed yield per vein(g)
Growth regulator				
Go-water spray	1.29	327	28.58	39.40
G_1-Ethereal 200ppm	2.87	294	26.96	78.87
G_2-Gibberlin 25 ppm	1.49	374	34.26	52.93
G_3-NAA 100 ppm	1.88	385	37.08	70.26
Fertilizers (NPK Kg/ha)				
F_1 (100:40:40)	1.49	314	29.84	42.65
F_2 (125:50:50)	1.97	337	28.92	56.65
F_3 (150:60:60)	2.18	384	36.40	81.11
Mean	1.88	345	31.72	60.14

For comparing the mean of	SEM±	CD at 5%	SEM±	CD at5%	SEM±	CDat5%	SEM±	CD at 5%
G	0.11	0.37	9.0	33.0	0.66	2.30	3.73	12.91
F	0.09	0.28	6.0	18.0	0.94	2.82	3.13	9.40
Fat Same G	0.18	NS	12.0	36.0	1.68	5.15	6.27	NS
Gat same or diff F	0.19	NS	14.	44.0	1.88	5.65	6.3	NS

Note: NS Non significant

Table -2 : Influence of nutrition and growth regulators on seed yield and Seed quality in pumpkin Cv.Arka chandan

Treatments	Seed yield /r plot(g)	Seed yield / ha(Kg)	100 Seed weight (g)	Seed germination(%)	Field emergence(%)
Growth regulator					
Go-water spray					
G_1-Ethereal 200ppm	1556.00	524.00	7.98	91(72.9)	86.6(68.8)
G_2-Gibberlin 25 ppm	1019.00	346.00	8.72	92(72.2)	87.4(69.3)
G_3-NAA 100 ppm	1384.00	471.00	9.42	91(73.4)	88.1(69.9)
Fertilizers (NPK Kg/ha)					
F_1 (100:40:40)	836.0	284.0	8.46	89(71.4)	84.4(66.8)
F_2 (125:50:50)	1116.0	379.0	8.11	91(72.8)	87.0(68.9)
F_3 (150:60:60)	1603.0	541.0	8.78	92(72.7)	89.8(71.4)
Mean	1185.0	402.0	8.45	91(72.3)	87.1(69.0)

For comparing the mean of	SEM±	CD at 5%	SEM±	CD at 5%	SEM±	CD at 5%	SEM±	CD at 5%	SEM±	CD at 5%
G	74.7	258.5	12.4	42.9	0.1	0.35	1.0	NS	0.73	NS
F	63.0	88.9	13.4	39.1	0.12	0.36	0.80	NS	0.53	NS
Fat Same G	126.0	NS	24.8	NS	0.24	0.71	1.60	NS	1.06	NS
Gat same or diff F	127.1	NS	26.3	NS	0.22	0.67	1.78	NS	1.23	NS

Note: NS Non significant
Figures in Parenthesis indicate Arcsine transformed values.

Similar results were also recorded by Das and Das (1995) in pumpkin, and Goudappalavar (2000) in tomato, Singh and Lal (1995) and Balaraj (1999) in chilli. The seed yield attributing factors did not vary significantly except for number of seeds per fruit and seed yield per fruit. The combined effect of NAA 100 ppm in organic fertilizer i.e. F_3 (150:60:60 kg NPK per ha) recorded maximum number of seeds per fruit (415) and seed yield per fruit (37.08 g) and minimum values obtained at water spray coupled with 100:40:40 kg NPK per ha (279) for number of seeds per fruit and Ethrel 200 ppm coupled with 100:40:40 kg NPK per ha for seed yield per fruit (22.71 g). These results are in accordance with the reports of Balraj (1999) in chilli. Seed quality parameters did not vary significantly except for seed weight. The maximum 100 seed weight (9.67 g) was recorded in the combined effect of NAA 100 ppm and 150:60:60 kg NPK per ha which was on par with NAA 100 ppm at 120:50:50 kg NPK per ha. Minimum 100 seed weight (7.33 g) was obtained due to combined effect of water spray (control) and 100:40:40 kg NPK per ha. The seed quality attributing characters like germination percentage, root length, shoot length, vigour index were not varied significantly due to interaction.

Department of Agriculture Engineering
College of Agricultural Engineering,
Marathwada Agricultural University
Parbhani - 431 402, (M.S.), India

C. T. MANJUNATH PRASAD
ASHOK S. SAJJAN
B. S. VYAKARANAHAL
H. L. NADAF
R. M. HOSAMANI

(Received: April, 2007)

References

Aiyelaagbe, I. O And Kintomo, A. A., 2002, Nitrogen response of fluted pumpkin (*Qelfairia occidentalis* Hook.) grown sole or intercropped with banana. *Nutrient Cycling in Agro ecosystems,* **64** : 231-235.

Ali, S. M., Moghadem, M. H., Yazdani, D. And Avval, P. A., 1999, Effect of plastic mulches, spacing and phosphorus and potassic fertilizer levels on the growth and yield of common pumpkin (*Cucurbita pepo* Convar *Pepo* var. Shyriaca). *Journal of Medicinal and Aromatic Plant Sciences*, **21**: 650-653.

Balaraj, R., 1999, Investigations of seed technological aspects in chilli (*Capsicum annuum* L.). *Ph.D. thesis,* University of Agricultural Sciences, Dharwad, India .

Das, B. C. and Das, T. K., 1995, Efficacy of GA_3, NAA and Ethrel on seed expression in pumpkin (*Cucurbita moschata* Poir.) cv. Guamala Local. *Orissa Journal of Horticulture,* **23** : 87-91.

Gedam, V. M., Patil, R. B., Suryawanshi, Y. B. and Mate, S. N., 1998, Effect of plant growth regulators and boron on flowering, fruiting and seed yield in bitter gourd. *Seed Research,* **26** : 97-100.

Goudappalavar, H. B., 2000, Effect of mother plant nutrition and chemical spray on seed yield and quality in tomato (*Lycopersicon esculentum* Mill.). *M.Sc. (Agri) Thesis,* University of Agricultural Sciences, Dharwad, India.

Lal, G., 1992, Pod and seed attributes of chilli pant C-1 in response to varying levels of nitrogen and spacing. *Seed Research,* **20** : 96-98.

Pandita, V. K. and Randhawa, K. S., 1992, Seed production studies in muskmelon under different planting density and fertilizer levels. *Seed Research,* **20**: 144-146.

Prem Nath, Dutta, O. P. And Vijay, O. P., 1973, Arka chandan the Carotene – rich pumpkin. *Indian Horticulture,* pp. 19-20.

Rafee Kher, M., Nair, S. A., Sorte, P. N., Hatwal, G. P. And Chandhan, P. M., 2002, Effect of growth regulators on growth and yield of summer cucumber. *Journal of Soils and Crops,* **12**: 108-110.

Shashidhara, G. B., 2000, Integrated nutrient management for chilli (*Capsicum annuum* L.) in alfisols of northern transition zone of Karnataka. *M.Sc. (Agri) Thesis,* University of Agricultural Sciences, Dharwad , India.

Singh, D. K. and Lal, G., 1995, Effect of plant growth regulators on the fruit set, yield and quality of chilli (*Capsicum annuum* L.) cultivars. *Advances in Horticulture and Forestry,* **4** : 133-141.

Sitaram, Habib, A. F. and Rudraradhya, M., 1988, Effect of plant growth regulators and date of sowing on sex expression with special reference to seed production in *Cucumis sativus* L. variety pickling melon. *Seeds and Farms,* **14** : 20-24.