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## Effect of nitrogen, phosphorus and potash on growth and yield of second Ratoon golden ROD (*Solidago canadensis* L.) CV. local under summer season in Saurashtra region

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### Abstract

An experiment was conducted to study the effect of nitrogen, phosphorus and potash on growth and yield of second ratoon golden rod (*Solidago canadensis* L.) cv. Local under summer season in *Saurashtra* region including three factors viz., N (200, 250 and 300 kg/ha), P (50 and 100 kg/ha) and K (25 and 50 kg/ha) and their combinations. Among them, application of nitrogen @ 300 kg/ha, phosphorus @ 100 kg/ha and potash @ 50 kg/ha significantly increase the growth parameters viz., plant height, plant spread, fresh weight of plant, dry weight of plant and number of suckers per plant; and yield attributes viz., number of panicles per plant and number of panicles per hectore.

**Keywords:** *Solidago canadensis* L., second ratoon, nutrient

### Introduction

*Solidago canadensis* L. is commonly known as 'golden rod', which belongs to family *Asteraceae*. Golden rod is perennial flower crop cultivated for its flower stalk. Yellow panicles are very attractive as cut flowers and also used in bouquet and table decoration purpose. It is used as filler material in floral arrangement. The crop does well in tropical climate. Division of stools, suckers or seeds propagate golden rod. It is the flower crop with greener biomass and it expands as a ratoon crop also, hence, it requires more amounts of different nutrients. In India, very little work has been carried out for various aspects particularly nutrient requirement of golden rod because it is minor flower crop and not much popular in the country. Therefore, the present investigation is undertaken to find out proper dose of nitrogen, phosphorus and potash fertilizer for second ratoon golden rod crop under summer season in *Saurashtra* climatic condition.

### Research Methods

The present investigation entitiled "Effect of nitrogen, phosphorus and potash on growth and yield of second ratoon golden rod (*Solidago canadensis* L.) cv. Local under summer season in *Saurashtra* region" was carried out at Instructional farm, Department of Horticulture, College of Agriculture, Junagadh Agricultural University, Junagadh during year 2011. Twelve treatment combinations consisting of three levels of nitrogen viz., 200 (N<sub>1</sub>), 250 (N<sub>2</sub>), 300 (N<sub>3</sub>) kg/ha, two levels of phosphorus viz., 50 (P<sub>1</sub>) and 100 (P<sub>2</sub>) kg/ha, two levels of potash viz., 25 (K<sub>1</sub>) and 50 (K<sub>2</sub>) kg/ha were tried in randomized block design with factorial concept. All twelve treatment combinations were replicated three times. The comparative LSD multiple range test (P= 0.05) was used to determine differences between treatments.

### Research Findings and Discussion

The results obtained from the present investigation as well as relevant discussion have been summarized under following sub heads:

#### Growth parameters

The data presented in Table 1 indicated that higher dose of nitrogen, 300 kg/ha (N<sub>3</sub>) significantly increases the growth parameters viz., plant height (97.83 cm), plant spread (530.55 cm<sup>2</sup>), fresh weight of plant (141.31 g), dry weight of plant (42.39 g) and number of suckers per plant (5.12). However, fresh and dry weight of plant and number of suckers per plant were found at par with application of 250 kg nitrogen/ha (N<sub>2</sub>). The poorest response was found in application of 200 kg nitrogen/ha (N<sub>1</sub>). Improvement in all above parameters was caused due to drawing of photosynthate to the flower as consequence of intensification of sink.

Also it might be due to the improved vegetative growth of plant under the highest level of nitrogen, which resulted in more storage and subsequent utilization of carbohydrates and thus improved various flower characters. Similar results are in agreement with the findings of Sodha and Dhaduk (2002) <sup>[11]</sup> and Rajput (2005) <sup>[8]</sup> in golden rod, Yadav *et al.* (2003) <sup>[12]</sup> in tuberose.

The data on growth parameters on Table 1 shows that, the higher dose of phosphorus 100 kg/ha (P<sub>2</sub>) gave maximum plant height (95.33 cm) and plant spread (512.23 cm<sup>2</sup>). While

other parameters remain non-significant. The lower results were found with the dose of phosphorus 50 kg/ha (P<sub>1</sub>). The result may be due to vital role of phosphorus in plant growth as it is an essential constituent of cell components such as phospho proteins and phospholipids, which are indispensable constituents of the various cell membranes and are also important for the maintenance of cell structure. The findings are with confirmed with Lale *et al.* (2003) <sup>[6]</sup> and Biswas and Parya (2008) <sup>[1]</sup> in golden rod, Gaikwad *et al.* (2004) <sup>[3]</sup> in China aster.

**Table 1:** Effect of nitrogen, phosphorus and potash on growth and yield parameters of golden rod

Treatments	Plant height (cm)	Plant spread (cm <sup>2</sup> )	Fresh weight of plant (g)	Dry weight of plant (g)	No. of suckers per plant	No. of panicles per plant	No. of panicles (lakhs/ha)
<b>Levels of Nitrogen (kg/ha)</b>							
N1-200	90.57	477.31	128.21	38.39	4.34	1.33	9.09
N2-250	91.71	482.42	136.24	39.97	4.93	1.42	9.77
N3-300	97.83	530.55	141.31	42.39	5.12	1.53	10.76
S.Em.±	1.56	11.20	2.98	0.85	0.17	0.05	0.33
C.D. at 5 %	4.56	32.84	8.74	2.49	0.51	0.16	0.97
<b>Levels of Phosphorus (kg/ha)</b>							
P1-50	91.41	481.29	131.76	39.48	4.65	1.36	9.65
P2-100	95.33	512.23	138.75	41.02	4.94	1.49	10.09
S.Em.±	1.27	9.14	2.43	0.69	0.14	0.04	0.27
C.D. at 5 %	3.73	26.81	NS	NS	NS	NS	NS
<b>Levels of Potash (kg/ha)</b>							
K1-25	92.52	482.13	130.17	39.00	4.66	1.40	9.77
K2-50	94.22	511.39	140.34	41.50	4.93	1.45	10.34
S.Em.±	1.27	9.14	2.43	0.69	0.14	0.04	0.27
C.D. at 5 %	NS	26.81	7.13	2.04	NS	NS	NS
<b>Intreactions</b>							
N x P	NS	NS	NS	NS	NS	NS	NS
P x K	NS	NS	NS	NS	NS	NS	NS
N x K	NS	NS	NS	NS	NS	NS	NS
N x P x K	NS	NS	NS	NS	NS	NS	NS
C.V. %	5.77	7.81	7.63	7.32	12.60	13.26	11.64

The data on growth parameters presented in Table 1 shows that, the application of potash @ 50 kg/ha (K<sub>2</sub>) gave significant result with plant spread (511.39 cm<sup>2</sup>), fresh weight of plant (140.34 g) and dry weight of plant (41.50 g). It might be due to role of potassium as is not a constituent of any organic compound; however, it is required as a cofactor for 80 or more enzymes. It controls movement of stomata and maintains electro-neutrality of plant cells (Marschner, 1995) <sup>[7]</sup>. These results are in conformity with those obtained by Biswas and Parya (2008) <sup>[1]</sup> in golden rod, Singatkar *et al.* (1995) and Karetha (2006) <sup>[10,4]</sup> in gaillardia, De and Dhiman (1998) <sup>[2]</sup> in chrysanthemum.

#### Yield parameters

The result shown as per Table 1, the maximum number of panicle per plant (1.53) and per hectore (10.76 lakhs) was recorded with the application of nitrogen @ 300 kg/ha (N<sub>3</sub>). However, it is at par with application of nitrogen @ 250 kg/ha (N<sub>2</sub>) in case of number of panicles per plant. The lowest result was recorded with the application of 200 kg nitrogen per hectore (N<sub>1</sub>). This might be due to vigorous growth and development of panicle with increase nitrogen level, which ultimately increases panicle weight as per as panicle number. The result is in line with Sodha and Dhaduk (2002) <sup>[11]</sup> and Rajput (2005) <sup>[8]</sup> in golden rod, Kumar *et al.* (2003) <sup>[5]</sup> in China aster, Sehrawat *et al.* (2003) <sup>[12]</sup> in marigold.

In case of yield parameters, phosphorus and potash were not significantly affecting the number of panicle per plant and per hectore.

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