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Effect of Organic Foliar Application on Seed Yield and Quality in Senna (*Cassia angustifolia*)

V. RAMASAMY AND A. VIJAYAKUMAR[1]

Department of Seed Science and Technology, TNAU, Coimbatore 641 003
jaisrivijay@yahoo.com

ABSTRACT An experiment was carried out with foliar application of organics viz. Panchagavya (2% & 4%), humic acid (0.2 % & 0.4 %), moringa leaf extract (2% & 4%) and in combinations at vegetative, flowering and pod filling stage to improve plant growth and seed yield in Senna. The result revealed that, the 4 per cent Panchgavya foliar spray induced earlier 50 per cent flowering (52.7 days), number of pods (53.0 plant^{-1}), shelling percentage (61.6 %) and pod yield (12.823 g plant^{-1}) resulting in maximum seed yield (7.902 g/plant). The highest 100 seed weight (2.543 g), seedling root length (11.84 cm), shoot length, (8.33 cm), dry matter production (107.3 mg seedlings^{-10}), vigour index (1869) and alpha amylase activity (12.1 mm) were registered by the resultant seed from 0.2 per cent humic acid foliar application. The result revealed that foliar application of 4 per cent Panchagavya (or) 0.2 per cent humic acid significantly increased the growth and yield and the resultant seed quality parameters.

Key words: Senna, Panchagavya, humic acid, germination, vigour index.

Senna (*Cassia angustifolia* Vahl) a drought tolerant herbal plant belonging to the family leguminaceae is used as Sidha and Ayurvedic medicine. It is one of the 32 priortorised medicinal plant having a huge demand [1]. Inadequate supply of high quality seed is one of the major constrains in limiting the medicinal plant cultivation. The demand for quality seeds are increasing due to the higher export potential of senna leaves. But no research has been undertaken for seed crop of senna in India. The large scale cultivation is not possible without the sufficient quantity of quality seeds. With this in view, the current study was focused on organic foliar application such as Panchagavya, humic acid and moringa leaf extract to improve plant growth parameters, yield and quality of seeds.

MATERIALS AND METHODS

The experiment was carried out at the medicinal garden of the Horticultural College and Research Institute, TNAU, Coimbatore during the year 2005. The senna plants were given with organic foliar application of Panchagavya (2% & 4%), humic acid (0.2% & 0.4%), moringa leaf extract (2% & 4%) and in combinations at vegetative, flowering and pod filling stages. Randomized block design is used as the experimental plot design with plot size of 3 x 2.5m in three replicates. The following observations were recorded replication wise in each treatment from the randomly selected ten plants.

Days to fifty per cent flowering, plant height at harvest, number of branches, number of pods plant^{-1}, number of seeds pod^{-1}, pod yield plant^{-1} and seed yield plant^{-1}.

Shelling percentage

The pods from each treatment were shelled

[1]Corresponding author address: Professor (Seed Science) and Deputy Registrar (Education), O/o the Registrar, Tamil Nadu Agricultural University, Coimbatore 641 003

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separately. The seed weight to the pod weight was computed and the mean for each treatment was expressed in percentage.

$$\text{Shelling percentage} = \frac{\text{Seed weight}}{\text{Pod weight}} \times 100$$

The cleaned, dried and graded seeds from each treatment were subjected for the following seed quality characteristics.

100 seed weight [2], germination [2], root and shoot length (cm), dry matter production (mg/10 seedlings), Vigour index [3] and Alpha - amylase activity [4].

RESULTS AND DISCUSSION

The study revealed that the days to 50 per cent flowering was minimum with Panchagavya 4 per cent in senna. This might be due to the reason that the maximum availability of nutrients to the plants from organic source. Similar result reported in tomato [5] with Panchagavya 3 per cent spray.

Plant height referred as an index of plant growth was the highest under panchagavya 4 per cent. The possible reason for increased plant height may be due to supply of all micro and macronutrients present in the panchagavya. By direct application of nutrients as foliar spray, the plant might have been absorbed the nutrients quickly. Increase in plant height due to panchagavya 4 per cent application has also been reported in *Coleus forskohlii* [6]. Another possible reason for higher growth characters might be due to the growth enzymes present in panchagavya, which favoured rapid cell division and multiplication. The similar result was reported in Bhumyamalaki [7]. In the present study, the beneficial effect of biostimulants was not well pronounced on number of primary branches (Table. 1).

The ultimate goal to be achieved in any management system is maximization of yield and the same was proved that all the biostimulants increased the yield parameters in senna. Among the treatments, panchagavya 4 per cent produced the significantly higher number of pods plant^{-1}, pod yield plant^{-1} and seed yield plant^{-1} (Table 2). The pronounced yield with increased dose of panchagavya might be due to sustained availability of N throughout the growth phase and also due to enhanced carbohydrate synthesis and effective translocation of these photosynthates to the sink i.e. pod. The proportion and activity

Table 1. Effect of organic foliar application on plant growth in Senna

Treatments		50% days to flowering	Plant height (cm)	Number of primary branches
T_1	Panchagavya (2%)	54.7	38.61	3.2
T_2	Humic acid (0.2%)	55.0	40.17	3.2
T_3	Moringa leaf extract (2%)	55.7	37.12	3.1
T_4	Panchagavya (4%)	52.7	44.58	3.3
T_5	Humic acid (0.4%)	55.3	37.27	3.0
T_6	Moringa leaf extract (4%)	55.7	37.15	3.2
T_7	$T_1 + T_2 + T_3$	53.3	42.06	3.3
T_8	$T_4 + T_5 + T_6$	55.7	37.05	3.2
T_9	Control	56.3	36.25	3.0
	Mean	54.9	38.92	3.2
SEd		1.683	1.180	0.365
CD (P=0.05)		NS	2.501	NS

Table 2. Effect of organic foliar application on seed yield in Senna

Treatments		No. of pods plant^{-1}	No. of seeds pod^{-1}	Pod yield plant^{-1}	Seed yield plant^{-1}	Shelling (%)	100 seed weight (g)
T_1	Panchagavya (2%)	46.2	7.17	11.374	6.889	61.6	2.345
T_2	Humic acid (0.2%)	48.3	7.17	11.681	7.231	61.9	2.543
T_3	Moringa leaf extract (2%)	43.9	7.03	10.617	6.423	60.4	2.279
T_4	Panchagavya (4%)	53.0	7.20	12.823	7.902	61.6	2.405
T_5	Humic acid (0.4%)	44.7	7.03	10.826	6.489	59.9	2.291
T_6	Moringa leaf extract (4%)	45.2	7.07	10.940	6.639	60.6	2.324
T_7	$T_1 + T_2 + T_3$	49.3	7.13	11.919	7.257	60.9	2.318
T_8	$T_4 + T_5 + T_6$	45.3	7.07	10.955	6.579	60.0	2.306
T_9	Control	43.5	7.03	10.519	6.307	59.9	2.281
Mean		46.6	7.10	11.295	6.858	60.8	2.343
SEd		1.534	0.126	0.343	0.220	0.342	0.023
CD(P=0.05)		3.251	NS	0.728	0.466	0.724	0.049

of beneficial microbes would have been at the higher rate during fermentation and thus helping in synthesis of growth promoting substances. Similar results were reported in brahmi [8]. The humic acid 0.2 per cent, panchagavya 2 per cent and panchagavya 4 per cent recorded more shelling percentage (Table 2).

Among the treatments, 0.2 per cent humic acid produced more 100 seed weight. This might be due to the supply of macro and micro nutrients by the humic acid for the vigorous plant growth resulted in better seed development and filling. The benovalent effect of humic acid viz., increased nutrient uptake, accelerated respiratory processes of plants, which enhanced the seed yield [9]. Similar result was also reported with increased boll weight in cotton with the foliar application of 0.1 per cent humic acid [10].

The 0.2 per cent humic acid treatment increased the resultant seed quality such as germination, root length, shoot length, vigour index, and dry matter production in senna (Table 3). This might be due to the micronutrient content and auxin substance present in humic acid supported for the vigorous growth of the plant resulted in the accumulation of more nutrient reserves in the resultant seed and also humic compounds radically influencing plants assimilation [11].

Among all the treatments, 0.2 per cent humic acid significantly increased the alpha amylase activity (Table 3). An enhanced diversion of free amino acid for protein synthesis mechanism and invertase activity enhanced by humic acid had a favourable effect on protein synthesis by stimulating the enzyme involved in protein

Table 3. Effect of organic foliar application on seed quality in Senna

Treatments		Germination (%)	Root length (cm)	Shoot length (cm)	Dry matter production (mg seedlings^{-10})	Vigour index	Alpha amylase activity (mm)
T_1	Panchagavya (2%)	92 (73.57)	10.96	8.09	106.3	1754	10.6
T_2	Humic acid (0.2%)	93 (74.66)	11.84	8.33	107.3	1869	12.1
T_3	Moringa leaf extract (2%)	90 (71.57)	10.42	7.97	94.3	1655	10.5
T_4	Panchagavya (4%)	93 (74.66)	10.98	8.14	106.7	1772	11.5
T_5	Humic acid (0.4%)	93 (74.66)	10.62	7.78	93.3	1705	9.5
T_6	Moringa leaf extract (4%)	91 (72.54)	10.95	7.83	94.0	1703	9.7
T_7	$T_1 + T_2 + T_3$	91 (72.54)	10.78	7.99	104.0	1715	10.8
T_8	$T_4 + T_5 + T_6$	91 (72.54)	10.85	7.76	91.7	1688	9.1
T_9	Control	90 (71.57)	10.42	7.69	91.0	1629	8.5
Mean		91 (72.54)	10.87	7.95	98.7	1721	10.2
SEd		1.912	0.179	0.128	1.971	45.442	0.300
CD (P=0.05)		NS	0.380	0.271	4.179	96.334	0.637

(Figures in parentheses are arc-sine values)

synthesis [11] were the possible reasons for increased alpha amylase activity.

The resultant seed quality of 4 per cent Panchagavya is also higher due to the benevolent effect of panchagavya discussed elsewhere and on par with results of 0.2 per cent humic acid.

Hence, the foliar application of organics viz. Panchagavya (4%) (or) humic acid (0.2%) at vegetative, flowering and pod filling stages can be recommended for getting higher yield of quality seeds in senna.

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