

# Seed Priming Studies in Cashew: Influence on Softwood Grafting

MEERA MANJUSHA AV AND PK RETHEESH

Regional Agricultural Research Station,  
Kerala Agricultural University, Pilicode, Kasaragod, Kerala-671310, India  
\*meera.manjusha@kau.in

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**ABSTRACT:** A study was conducted at the Kerala Agricultural University, Regional Agricultural Research Station (Northern Zone), Pilicode to study the influence of different seed priming agents on the growth and vigour of the rootstock seedlings and its further effect on softwood grafting using the variety Priyanka. The cashew grafts with the rootstocks grown out of  $\text{KNO}_3$  3% primed seeds resulted in the highest increase in plant height (10.5%) and the number of leaves (80.85%) per plant. The optimum time of transplanting cashew grafts is at its age of 5-6 months with 5-7 functional leaves and 30-45 cm height. The results show that such quality grafts are obtained within two months when rootstocks are subjected to seed priming with  $\text{KNO}_3$  3%. Hence the seed priming with  $\text{KNO}_3$  3% could be recommended as a suitable method for raising quality roots stocks with increased success and vigorous growth through soft wood grafting in cashew.

**Keywords:** Seed priming, Cashew, Rootstocks, Softwood grafting,  $\text{KNO}_3$

Cashew (*Anacardium occidentale L.*) is an important cash crop in India. It is a very hardy crop. Unlike other cultivated crops, cashew can tolerate drought. It can grow well in marginal lands also. Cashew does not demand continuous care and attention. The crop gives profitable yields even with low level of inputs. Due to these advantages, cashew cultivation is now largely extended to its several non-traditional growing areas of India. A sufficient quantity of good quality planting material is a challenging concern in cashew cultivation. At present, softwood grafting is the widely adopted method for quality planting material production in cashew. Vigour of root stock and scion are the most critical factors determining the production of elite planting materials through successful grafting. Seed priming has proven effective in improving germination and emergence in many other crops. Cashew had responded to seed priming and exhibited an increased seedling length and vigour when subjected to osmopriming with gibberellic acid at 200ppm concentration [1]. The early vigorous growth of the seedlings could reduce the period required for healthy planting material production. Such root stocks will help to reduce the heavy mortality occurring at the infant stage of the grafts. Hence an experiment was conducted at the Kerala Agricultural University Regional Agricultural Research Station (North Zone), Pilicode to determine the

effect of various seed priming agent success of softwood graft production in cashew and its vigour.

## MATERIAL AND METHODS

The study was conducted at the nursery area of the Kerala Agricultural University Regional Agricultural Research Station (North Zone), Pilicode. The experiment was carried out in a completely randomized design with eight seed priming treatments and non-primed seeds as control with four replications. Cashew (variety: Priyanka) seeds of uniform age, size and weight were used for the experiment. The seeds were primed with specific primer (KCl,  $\text{KNO}_3$ , Urea or water) for 12 h and distilled water for 24 hours. Then seeds were washed twice with distilled water and were immediately sown, with stalk end facing upwards, in growth media filled black polythene bags of size 20 cm x 15 cm. The growth media was a mixture of equal quantities of sand, soil and well decomposed farm yard manure. Fifty-five such bags were present in every treatment replication. At 45 days after germination, the seedlings were subjected to softwood grafting. The seedlings were beheaded at equal height, and the rootstocks were grafted using the scions of the same length taken from the trees of the same variety that are maintained in the cashew progeny orchard of the station.

**Table 1.** Effect of seed priming agents on the grafting success in cashew variety Priyanka

Treatments	Success in grafting, %		
	30 DAG	45 DAG	60 DAG
KCl 0.5%	40.00 (39.23)	40.19 (39.38)	41.06 (39.85)
KCl 1.0%	20.00 (26.54)	26.67 (31.09)	26.67 (31.09)
KNO <sub>3</sub> 1%	40.00 (39.23)	73.33 (58.92)	73.33 (58.91)
KNO <sub>3</sub> 3%	40.00 (39.23)	73.25 (58.89)	73.33 (58.92)
Urea 5%	26.67 (31.09)	51.83 (46.05)	60.00 (50.77)
Urea 10%	52.58 (46.48)	53.33 (46.91)	53.33 (46.91)
Distilled water 12hrs	46.67 (43.09)	66.67 (54.75)	66.67 (54.74)
Distilled water 24hrs	53.33 (46.91)	66.67 (54.75)	66.67 (54.74)
Direct sowing	73.33 (58.92)	73.33 (58.92)	80.00 (63.44)
F Test	**	**	**
<b>CD (p=0.05)</b>	<b>1.54</b>	<b>2.02</b>	<b>2.02</b>

## RESULTS AND DISCUSSION

Concerning the percentage of successful grafts, the seed priming treatments had a differential response. At 30 days after grafting (DAG), the highest percentage of successful grafts was obtained from those root stocks which were developed from non treated seeds. This was followed by the treatments of KNO<sub>3</sub> 1% and 3%. At 45 DAG and 60 DAG, grafts with root stocks originating from non-treated (direct sown) seeds maintained the highest success level. The success level of grafting root stocks

that were derived from the seeds treated with KNO<sub>3</sub> 1% and 3% was on par with the distilled water for 24 hours of treatment at 30 DAG and 45 DAG. But KNO<sub>3</sub> 1% and 3% had the edge over the distilled water treatment at 60 DAG. The influence of weather parameters like humidity and temperature on the survival of grafts might have given higher graft success in direct sown rootstocks by encouraging proper callus formation and strong union between the stock and scion.

The seed priming agents could not influence the number of leaves per graft at 30 DAG and 45 DAG. At 60 DAG the number of leaves was highest with KNO<sub>3</sub> 3% (9.50, 80.95% increase respectively, over the control treatment). The height of the grafts was highest with distilled water for 24 hours of treatment at both 30 and 45 DAG. At 45 DAG this was statistically on par with KNO<sub>3</sub> 3%, Urea 5 and 10% and Direct sowing treatments. At 60 DAG the height was highest with KNO<sub>3</sub> 3%, which was statistically on par with all the treatments except Urea 10%, distilled water for 24 hours and direct sowing treatments. Urea 10% resulted in the shortest grafts. The role of potassium in ionic balance is reflected in nitrate metabolism [2]. Nitrogen is an active participant of chlorophyll and protein and is an essential element for plant growth. Treatments with potassium might have resulted in an increase in leaf potassium content accompanied by increased rates of photosynthesis, photorespiration and RuBP carboxylase activity. This could be one of the reasons for the supremacy of the KNO<sub>3</sub> 3% treatment to improve the biometric characteristics of the grafts. Similar results were reported in mango of the same botanical family [3-4]. The vigour enhancement of the rootstocks by KNO<sub>3</sub> might have

**Table 2.** Effect of seed priming agents on the biometric characters of cashew grafts of variety Priyanka

Treatments	Number of leaves/graft			Height of grafts, cm		
	30 DAG	45 DAG	60 DAG	30 DAG	45 DAG	60 DAG
KCl 0.5%	3.19	4.73	6.69	28.71	31.92	45.25
KCl 1.0%	3.50	3.50	6.08	25.69	32.54	42.75
KNO <sub>3</sub> 1%	3.50	3.75	5.83	25.69	32.54	43.98
KNO <sub>3</sub> 3%	3.33	4.50	9.50	29.67	34.33	46.17
Urea 5%	3.00	3.67	6.44	30.33	34.93	43.78
Urea 10%	3.72	3.72	4.67	31.89	35.56	39.89
Distilled water 12hrs	2.89	3.08	5.67	29.22	33.35	44.58
Distilled water 24hrs	3.33	4.00	4.34	36.56	37.25	41.33
Direct sowing	3.21	4.13	5.25	28.33	36.92	41.81
F Test	NS	NS	**	**	**	**
<b>CD(p=0.05)</b>	<b>-</b>	<b>-</b>	<b>1.45</b>	<b>2.31</b>	<b>3.47</b>	<b>3.46</b>

resulted in better nutrient availability for the scions and, thereby better growth of the grafted plants. Better biometric characters in cashew grafts with vigorous rootstocks subjected to pretreatments had been reported by [5].

### CONCLUSION

Seed priming with  $\text{KNO}_3$  3% can ensure healthy rootstock and vigorous growth of the grafted plants in cashew though its effects were not prominent during the early healing periods of the graft, up to 45 DAG. Also, seed priming with  $\text{KNO}_3$  3% could ensure the quality standards stipulated by Directorate of Cashew nut and Cocoa development under the Government of India that the cashew grafts should have 5-7 functional leaves. And 30-45cm height at the time of transplanting [6], at a very early stage i.e. 2 months in against the six-month duration when the standard on-priming method is followed.

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