

EFFECT OF GROWTH REGULATORS AND FUNGICIDE ON SEED GERMINATION AND SEEDLING VIGOUR OF KAGZI LIME

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Kagzilime (*Citrus aurantifolia* Swingle) is an important citrus crop grown on commercial scale in India including Madhya Pradesh. It can be propagated by seed, layering marcottage and budding, however it is grown by seeds all over the country. This method is the easiest and cheapest and generally employed on a commercial scale in this fruit crop. Maintenance of higher seed germination and vigour of kagzilime from harvest until planting is the most important factor in its propagation programme. Seeds of kagzilime are small, oval shaped, pointed and poly-embryonic. Seeds have less viability when allowed to dry. Seed treatment with different plant growth regulators as well as fungicides has given remarkable encouraging results in several fruit crops. The work on the combined impact of growth regulators with fungicides on seed germination and seedling vigour of kagzilime was lacking in this region, hence the present experiment was taken up. A field experiment was conducted during the rainy season 2010 at the Fruit Research Station, College of Agriculture, Rewa

(M.P.). The soil of the experimental field was red-black with clay-loam in texture. The experiment was laid out in the randomised block design with three replications. There were 20 seeds per treatment having 1.0 m x 0.20 m plot size. Thus, the total seeds were 480 in the 24 plots of the experiment. The seeds were treated with GA @ 10 ppm and NAA @ 50ppm. The fungicide Saaf (Mancozeb+Carbendazime) @0.2% was used for the seed treatment. These products were used as single and in different combinations forming total eight treatments including a check immediately after extraction. The treated seeds were sown on 1 August, 2010 plot wise in the prepared nurseries keeping 20 cm distance between rows and 5 cm between plants. The seedlings were raised as per recommended package of practices. The specified observations on seed germination, growth and physiological parameters including root studies were taken up periodically. Leaf area was recorded through Automatic Area meter Model CI-202.

Table 1: Germination, growth, seedling vigour and root studies of Kagzilime as influenced by different growth regulators and fungicide

Treatments	Days taken to start germination	Days taken to complete germination	Germ inatio n (%)	Seedling length (cm) (135 DAS)	Shoot diameter (mm) (135 DAS)	No. of leaves (135 DAS)	Fresh wt. of leaves (g) (135 DAS)	Dry wt. of leaves (g) (135 DAS)	Seedling vigour index (90 DAS)	Leaf area index (90 DAS)	Root length (cm) (135 DAS)	Fresh wt. of roots (g) (135 DAS)	Dry wt. of roots (g) (135 DAS)
GA	16.00	23.67	71.6	19.07	0.43	22.73	0.11	0.064	1217	7.40	21.40	0.62	0.09
NAA	18.33	23.67	75.0	20.13	0.25	22.63	0.12	0.067	1441	8.69	25.20	0.34	0.04
Saaf	19.00	24.00	70	19.57	0.26	2.53	0.07	0.054	1036	7.14	20.27	0.31	0.05
GA + NAA	15.67	20.67	78.3	21.23	0.26	23.20	0.13	0.070	1410	8.42	24.57	0.76	0.11
GA + Saaf	16.00	22.33	66.6	20.70	0.31	21.23	0.07	0.053	107	5.83	23.27	0.66	0.09
GA+ NAA + Saaf	15.67	21.33	86.6	22.30	0.23	27.97	0.13	0.072	1954	9.20	28.30	0.67	0.07
NAA + Saaf	17.00	23.00	85.0	22.07	0.24	26.37	0.14	0.092	1800	9.43	27.33	0.59	0.08
Untreated Check	20.00	25.67	60.0	16.33	0.22	17.83	0.05	0.032	783	2.85	17.73	0.22	0.02
C.D. at 5%	1.59	0.65	13.4	0.61	NS	0.73	0.03	0.003	274.9	0.39	0.45	0.04	0.03

GA- Gibberellic acid, NAA- Naphthalene acetic acid, Saaf-(Mancozeb + Carbendazime)

The separate or combined application of GA (10 ppm) and NAA (50 ppm) accelerated seed germination in 15.67-18.33 days and terminated in 20.67-23.67 days compared to control. The early germination due to GA and NAA has also been reported by Kalabandi *et al.* (2003). Equally higher seed germination (85.0 to 86.67 %) was obtained from NAA + Saaf fungicide (2 g kg ha⁻¹) with or

without GA. Both these treatments also recorded almost equally higher seedling length (22.07 to 22.30 cm), number of leaves (26.37-27.97), fresh and dry weight of leaves, seedling vigour index (1800-1954), leaf area index (9.20-9.43), root length (27.33-28.30 cm), fresh and dry weight of roots over the other treatments. This might be attributed to the synergistic effects of these combined inputs in the stimulation of

combined growth through cell division and expansion, improved physico-chemical properties of protoplasm, respiration, nucleic acid metabolism etc. The untreated check recorded the significantly lowest

all these parameters. These results corroborate with those of Joolka *et al.* (2004), Dubey *et al.* (2010) and Bisen *et al.* (2010).

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