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The effect of chlormequat chloride (CCC) in relation with harvesting time on seed and pod characteristics of four okra cultivars.

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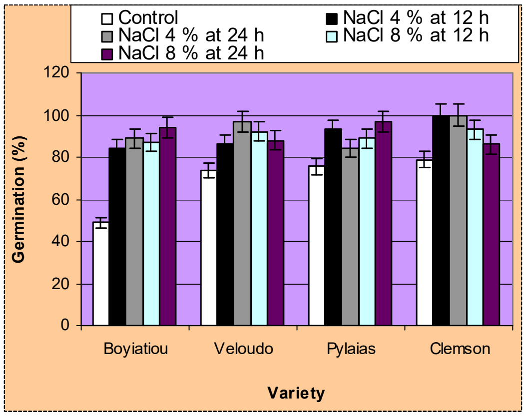
Introduction: Chlormequat or chlorocholine chloride (2-chloroethyltrimethyl-ammonium chloride, CCC) is an anti-gibberellin growth retardant (Sharma et al., 1998) that inhibits both cell division and cell elongation (Bode and Wild, 1984). The application of CCC to plants represses the growth of stems, leaves and stolons, but improves photosynthetic capacity by increasing leaf chlorophyll content (Huiqun et al., 2009).

The aim of this research was to evaluate the effect of CCC on the pod and seed yield characteristics of four okra cultivars in relation to harvest time.

Materials and methods: The present study was carried out at the Experimental Farm of the Benaki Phytopathological Institute during the growing season of 2022. Seeds of four okra cultivars ('Boyatiou', 'Veloudo', 'Pylaias' and 'Clemson') were sown in seed trays on 13 May until field transplantation at the 3-4 true leaf stage 20 days after sowing (2 June). Chlormequat chloride (CCC) was provided by BASF S.E., Germany and applied to the whole plant by a hand sprayer at the following levels: C1= 750 mg l-1 C2= 2500 mg l-1 C3= 0 mg l-1 (water, control). For acid scarification, sulphuric acid (96%) for 20 min was applied. For seed priming, salt solutions (NaCl) were prepared at concentrations of 4 and 8 % in which 10 g of seeds were soaked for 12 or 24 h.

Results and Discussion: The results of this study indicated that chlormequat chloride (CCC) generally had no effect on seed germination across the cultivars, except for 'Veloudo' at a concentration of 2500 ppm, which appeared to enhance germination. Additionally, CCC did not significantly impact seed moisture content, though an increase in moisture content was observed in 'Boyiatiou' at 35 and 40 days after anthesis (DAA) in the C1 treatment. CCC application consistently reduced plant height in all cultivars without significantly affecting flower induction, pod set, or the 100-seed weight (Bode & Wild, 1984; Huiqun et al., 2009). Acid scarification and NaCl priming were effective in reducing hard seeds and improving germination rates, particularly in 'Boyiatiou' (Demir, 2001).The discussion highlights that cultivar differences relate to their specific genetic responses and growth conditions. For instance, 'Clemson' produced the highest number of flowers and pods,

Figure 1:- Influence of priming with NaCl on okra seed germination in relation to the concentration of NaCl and the duration of treatment (Seeds of each cultivar were randomly selected from the pooled seed of all treatments).



while 'Boyiatiou' had lower seed performance due to high percentages of immature and hard seeds at early harvests. The findings also show that harvesting at 30 DAA resulted in lower germination rates across all cultivars, indicating seed immaturity. In 'Boyiatiou,' reduced moisture levels during seed maturation contributed to seed hardness, which was alleviated by six months of storage and acid scarification. These methods proved effective in enhancing germination, particularly for seeds susceptible to hardness (Passam & Rekoumi, 2009). Bottom of Form

Conclusion: The primary effect of CCC was to reduce plant height. There was, however, little or no effect of CCC flowering and pod set, hence yield. In cv. 'Veloudo' CCC (2500 mg L^{-1}) increased seed germination, but there was no effect of CCC at either 750 or 2500 mg L^{-1} in the other cultivars. Irrespective of CCC application, seed yield and quality are primarily determined by the genotype. Post-harvest seed treatments (scarification, priming) and seed storage may improve seed quality (germination).

Keywords: Chlormequat chloride (CCC), Seed germination, Okra cultivars, Plant height reduction, Post-harvest seed treatments

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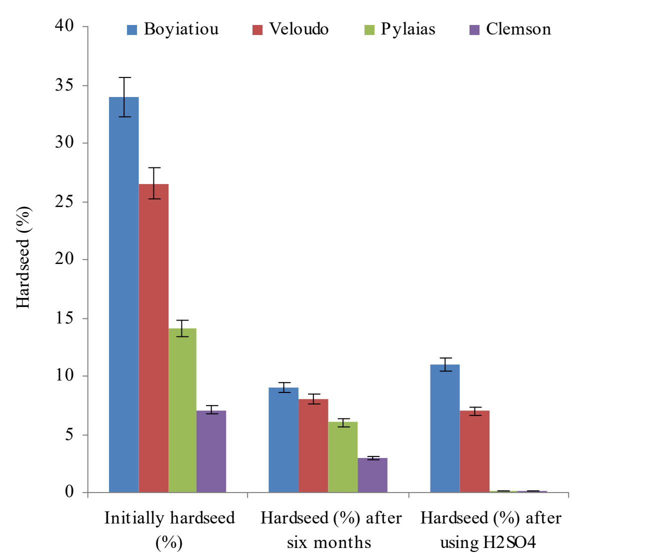

Figure 2: The percentage of hard seeds in four okra cultivars prior to and after six months of storage at room temperature and in relation to acid scarification (Seeds of each cultivar were randomly selected from the pooled seed of all treatments).