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# *In vitro* propagation via seeds of *Capparis ovata* Desf.

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***In vitro* propagation of *Capparis ovata* Desf. was conducted using seeds of a Moroccan ecotype, *C. ovata* Desf. (ENAM green house / origin: Hamria). High seed germination percentage (70%) was achieved on Murashige and Skoog (MS) medium, supplemented with 1.5 mg/l benzylaminopurine + 0.01 mg/l acid indol-3-butyrique + 0.1 mg/l gibberellic acid after a dormancy breaking treatment by gibberellic acid and water.**

**Key words:** *Capparis ovata* Desf., seed, *In vitro* propagation, $GA_3$.

## INTRODUCTION

Caper bush (*Capparis ovata* Desf.) cultivation has been introduced as a specialized culture in Morocco. Caper shows the characteristics of a plant adapted to poor soils, where water and nutriments are major limiting factors; it has a deep root system up to 40 m, and therefore, it can be used to prevent soil erosion in sloppy areas (Kenny, 1997). Locally, the commercially valuable parts of caper are the immature flower buds, and semi-mature fruits, which are pickled in vinegar or preserved in granular salt. Recently, there has been some interest in growing caper as a commercial crop, but problems have arisen regarding the poor germination of the seeds and serious rooting problems associated with cuttings (Deora and Shekhawat, 1995). Barbera and Di Lorenzo (1982, 1984) reported that the germination percentage of caper seeds is poor, only 5% obtained within two to three months of seeding. Cappelleti (1946) in Italy, and Luna and Pèrez (1985) in Spain also observed low germination percentages after direct sowing under field conditions. Bond (1990), in the USA obtained 10% of germination percentage after using fresh seeds kept in pots above 18°C. Sozzi and Chiesa (1995) explained this phenomenon of dormancy of the caper seed by the covering structures of the seed.

To ensure high germination, heat, light, dark, temperatures, photoperiod, $KNO_3$, $GA_3$ and NAA treatment have been applied in caper plant (*C. ovata*) (Soyler and Arslan, 1999; Soyler and Khawar, 2006, 2007). This study aimed at establishing *in vitro* procedure for rapid propagation of a Moroccan ecotype via seed germination and sought a method for ensuring satisfactory seed germination.

## MATERIALS AND METHODS

The seeds were collected from dehisced fruits during December 2007 (ENAM greenhouse / Origin: Hamria). Surface disinfestations was accomplished by soaking the seeds in 70% sodium hypochlorite for 15 min and rinsed three times after a dormancy breaking treatment by gibberellic acid ($GA_3$) and water. The seeds were treated with 1500 mg/l $GA_3$ for 24 h followed by soaking in water for 24 h. Germination was conducted at 25±2°C using an intensity of 1500 Lux of the light using 12 h light photoperiod, on 10 different agar-gelled media (Table 1). For each medium, 100 seeds were used (25 seeds × 4 replications), seeds were considered germinated when the radical emerged (Sozzi and Chiesa, 1995). Results were recorded up to 30 days.

### Statistical analysis

For all the experiments, differences among treatments were evaluated by performing the Ducan's test using XLSTAT computer program.

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**Table 1.** Ten media used for the germination of seeds.

| Medium | Composition |
|---|---|
| M1 | MS medium (1962) |
| M2 | MS + 4 mg/l Biotine + 3 mg/l BAP + 2 g carbon actif |
| M3 | MS + 1.5 mg/l BAP + 0.05 mg/l AIB |
| M4 | MS + 1.5 mg/l BAP + 0.01 mg/l AIB + 0.1 mg/l $GA_3$ |
| M5 | MS + 1.5 mg/l BAP + 0.1 mg/l AIB + 0.5 mg/l $GA_3$ |
| M6 | MS + 1.5 mg/l BAP + 0.01 mg/l AIB + 0.5 mg/l $GA_3$ |
| M7 | MS + 3 mg/l BAP + 0.1 mg/l AIB |
| M8 | MS + 3 mg/l BAP + 0.02 mg/l AIB + 0.2 mg/l $GA_3$ |
| M9 | MS + 3 mg/l BAP + 0.2 mg/l AIB + 1 mg/l $GA_3$ |
| M10 | MS + 3 mg/l BAP + 0.03 mg/l AIB + 1 mg/l $GA_3$ |

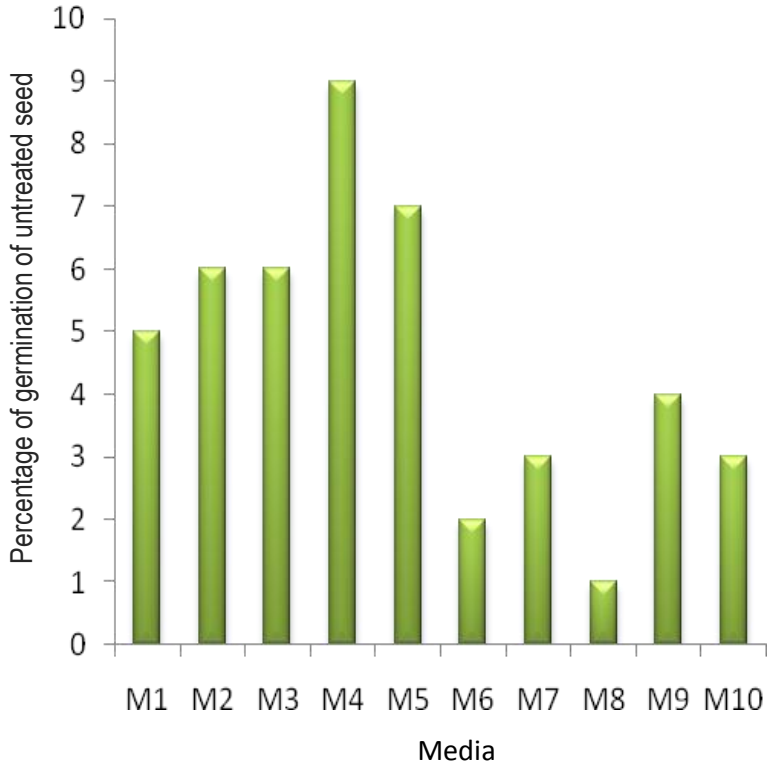


**Figure 1.** Effect on different media on germination of untreated seeds of *Capparis ovata*.

## RESULTS AND DISCUSSION

A low rate of 1 to 9% germination was observed on untreated seeds, even after 30 days (Figure 1). On the other hand, treated seeds germinated within three days on 10 substrates (Figure 2). The best results (70%) were obtained on a Murashige and Skoog (MS) medium supplemented with 1.5 mg/l 6-benzylaminopurine (BAP) + 0.01 mg/l acide indol butyrique (AIB) + 0.1 mg/l $GA_3$. Daily observations showed radicle emerging from the cut end onto the different substrates and a rapid development of the embryonic organs on agar-gelled MS medium supplemented with BAP, AIB and $GA_3$. Approximately, 16% of these germinated seedlings were transformed to plant after one month of culture on the same medium. Chalak et al. (2001) reported that the addition of $GA_3$ to the substrate was not significantly effective in enhancing the germination, because these differences disappeared after one month growth of seedling on MS proliferation medium. Orphanos (1983) and Sozzi and Chiesa (1995) suggested that $GA_3$ had only synergistic effects on scarified seed. It is suggested that BAP and AIB had a highly significant effect to the development of embryonic organs; similarly, Chalak et al. (2001) used the two hormones

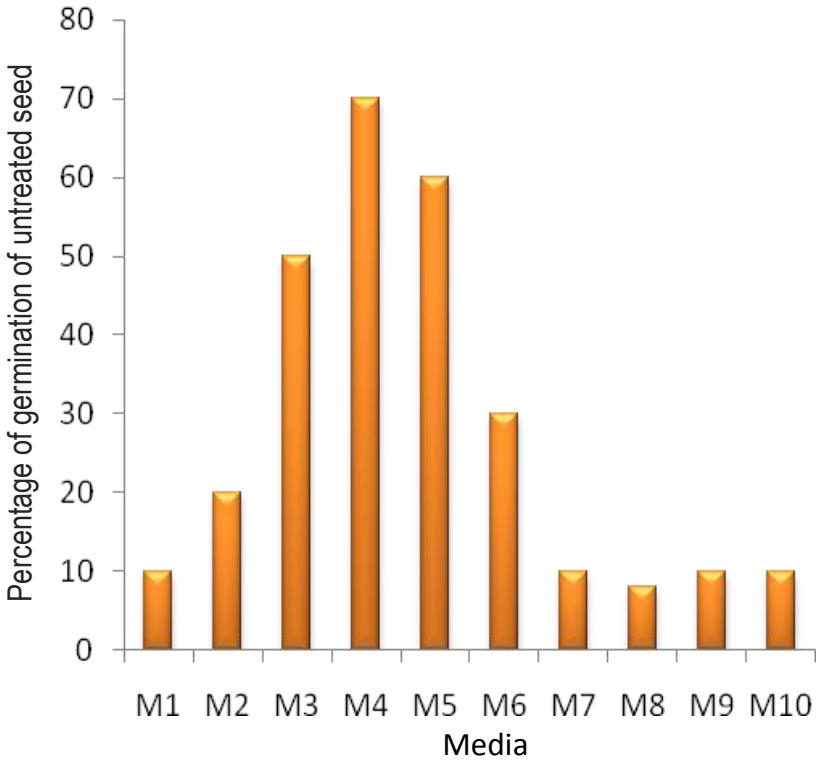


**Figure 2.** Effect on different media on germination of treated seeds of *Capparis ovata*.

to proliferate the nodal cuttings. Temperatures, pre-soaking treatment and light have been performed to improve the germination percentages of caper seeds by Soyler and Arslan (1999). Soyler and Khawar (2007) reported role of NAA and $GA_3$ in breaking seed dormancy and determine the extent of their effectivity in seed germination of *Capparis ovata* var. *herbacea* from Turkey. The Seeds were initially immersed in warm water (40°C) overnight and treated with H2SO4 for 20 min. These seeds were left out in the germination cabinets, for 28 days by soaking them in 100, 250, 500 or 2000 mg/l of NAA and $GA_3$ each for ½, 1, 2, 6 or 24 h. The highest germination rate of 61% was obtained from the seeds treated with $GA_3$ for 24 h.

Soyler and Khawar (2006) investigated seed germination response of *C. ovata* Desf. var. *Palaestina* Zoh from Turkey in another study by subjecting the seeds to 5.78 mM $GA_3$, 5.78 mM $GA_3$ + scarification, 19.78 mM $KNO_3$, 19.78 mM $KNO_3$ + scarification and cold treatment + scarification, at 15°C, 20°C and a variable temperature of 20 to 30°C, either in 12 h photoperiod, at continuous light for 24 h (42 µmol $m^{-2}$ $s^{-1}$) or in continuous dark. In general, 5.78 mM $GA_3$ + scarification had a positive effect on seed germination under all light conditions examined at a changing temperature of 20 to 30°C. However, the highest seed germination was recorded from scarified 5.78 mM $GA_3$ treated seeds treated at an alternatively changing temperature under a photoperiod of 12 h light and 12 h dark. The results show that the seeds were characterized by a combined (physical, light, thermal and physiological) type of dormancy, with the seed coat involved in the maintenance of physical dormancy. It is assumed that variations in results might be due to variation of treatments and genotypes used in Moroccan and Turkish genotypes.

## Conclusion

The results of this study indicate the enormous potential of caper that could be used in mass propagation. The technical establishment of the protocols used in germination of seeds should allow the cultivation of the Moroccan caper as a new promising market crop. There is need to carry out more studies to enhance the germination potential of Moroccan genotypes by carrying out further experiments.

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