



Short Note

## Optimization of Dormancy Breaking Treatments for Germination Improvement of Glory Lily (*Gloriosa superba* L.) Seeds

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**An experiment conducted to optimize the seed dormancy breaking treatment in Glory lily (*Gloriosa superba* L.) revealed that soaking the seeds in hot water (boiled to 100° C and removed from the flame) for 40 minutes had effectively improved the seed germination (62 %), seedling length (27.1 cm), seedling dry matter (181.0 mg) and vigour index (1680) accompanied with less hard seeds (15 %) and minimum abnormal seedlings (14 %), compared to acid scarification with concentrated H<sub>2</sub>SO<sub>4</sub> for 2 minutes that improved the germination (52 %) over non-scarified seeds (22 %), but led to the development of abnormal seedlings (14 %) and dead seeds (12 %) at an increased level.**

**Key words:** Glory lily, seed dormancy, hot water soaking, germination, vigor

*Gloriosa superba* L. belonging to the family Liliaceae commonly known as glory lily, superb lily, tiger lily or tiger claws, is an important medicinal plant of the Tropics (Ridley, 1924). The glory lily is native to both Asia and Africa. Paramasivam and Arumugam, (1991) reported that major problems in the cultivation of glory lily were scarcity of planting material and lack of information on seed dormancy breaking techniques. Even though several treatments like cold and hot water soaking, acid and mechanical scarification for varying durations have been suggested by several authors (Al-Helal *et al.*, 1989; Thomas, 1994; Revathi, 2001) for different crops, none of the treatments were tried to overcome seed dormancy in glory lily. Keeping this in view, the present investigation was carried out.

### Materials and Methods

The laboratory experiment was conducted during 2007- 2008 at the Department of Seed Science and technology, Tamil Nadu Agricultural University, Coimbatore to optimize the seed dormancy breaking treatment in glory lily. Five dormancy breaking treatments were imposed with a control. The experiment was laid out in three replications. For hot water soaking treatments, the seeds were soaked in boiled water (100°C) immediately after removing the water from flame for different durations. In H<sub>2</sub>SO<sub>4</sub> scarification treatments, the seeds were scarified with commercial sulphuric acid for different durations. Immediately after scarification, the seeds were washed with water thoroughly. After the treatments, the seeds were placed for germination in petri-plates to record the speed of

germination (Maguire, 1962). The seed germination test was conducted in roll towel method and the observations were recorded on germination percentage, root and shoot length, seedling dry matter, vigour index, abnormal seedlings, hard seeds and dead seeds percentage (ISTA, 1999).

### Results and Discussion

In the present investigation, the seeds of glory lily soaked in boiled water (100°C) for 40 minutes recorded the highest germination of 62 per cent accompanied with faster rate of germination (4.23), higher seedling length (27.1 cm), dry matter production (181 mg seedlings<sup>-10</sup>) and vigour index (1680), compared to control seeds (22% germination) (Table 1). The higher seed germination due to soaking in hot water might be due to the weakening of seed coat by distributing and dissolving the lignins and pectins present on epidermal layer of the seed coat, which render them impermeable to water and oxygen. However, hot water soaking treatment for less than 40 minutes duration is ineffective as it could be seen from the higher percentage of hard seed (36 %) at the end of germination test.

In contrast, longer period of treatment beyond 40 minutes was harmful as it could be seen from the production of more abnormal seedlings (24 %) and dead seeds (27 %), even though the hard seed content was minimum (8 %) at the end of germination test (Table 2). These results are in agreement with the findings of Kumari and Kohli (1984), Mehta and Sen (1991) and Kalavathi (1996) in *Cassia angustifolia* and Sivakumar (2005) in *Abelmoschus moschatus*

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**Table 1. Effect of dormancy breaking treatments on speed of germination, germination, seedling length and dry matter production in glory lily**

Treatment	Speed of Germination (%)	Germination (%)	Root length (cm)	Shoot length (cm)	Dry matter production (mg seedlings <sup>-10</sup> )
T <sub>0</sub> - Control (untreated)	2.65	22 (27.9)	12.7	8.1	149
T <sub>1</sub> - Soaking in hot water for 20 min.	4.19	46 (42.70)	14.5	10.7	166
T <sub>2</sub> - Soaking in hot water for 40 min.	4.23	62 (51.94)	16.1	11.0	181
T <sub>3</sub> - Soaking in hot water for 60 min.	4.02	41 (39.81)	13.8	10.6	160
T <sub>4</sub> - Scarification with H <sub>2</sub> SO <sub>4</sub> for 2 min	4.14	52 (46.14)	15.0	10.9	179
T <sub>5</sub> - Scarification with H <sub>2</sub> SO <sub>4</sub> for 4 min	4.13	46 (42.14)	14.9	9.6	158
T <sub>6</sub> - Scarification with H <sub>2</sub> SO <sub>4</sub> for 6 min	3.82	40 (39.23)	13.2	9.8	152
Mean	2.26	44 (41.63)	8.35	5.89	95.41
SEd	0.086	0.787	0.323	0.228	3.761
CD(P=0.05)	0.178	1.688	0.667	0.471	7.763

(Figures in parentheses are transformed values)

Though acid scarification of seeds with concentrated H<sub>2</sub>SO<sub>4</sub> for 2 minutes improved the germination (52 %) over non-scarified seeds (22 %), development of abnormal seedlings (14 %) and dead seeds (12 %) were noticed to an increased

level, which might be due to the injury caused to the embryo by the acid as reported by Al-Helal *et al.*, (1989). Similar results on the effect of sulfuric acid treatment have been reported in several temperate and subtropical species. (Willan, 1985). This study

**Table 2. Effect of dormancy breaking treatments on vigour index, abnormal seedling production, hard and dead seed contents in glory lily**

Treatment	Vigour index	Abnormal seedlings (%)	Hard seed (%)	Dead seeds (%)
T <sub>0</sub> - Control (untreated)	458	10 (18.43)	68 (55.55)	0 (0.62)
T <sub>1</sub> - Soaking in hot water for 20 min.	1159	12 (20.26)	36 (36.87)	6 (14.17)
T <sub>2</sub> - Soaking in hot water for 40 min.	1680	14 (21.97)	15 (22.78)	9 (17.45)
T <sub>3</sub> - Soaking in hot water for 60 min.	1000	24 (29.33)	8 (16.43)	27 (31.30)
T <sub>4</sub> - Scarification with H <sub>2</sub> SO <sub>4</sub> for 2 min	1347	14 (21.97)	22 (27.97)	12 (20.26)
T <sub>5</sub> - Scarification with H <sub>2</sub> SO <sub>4</sub> for 4 min	1127	16 (23.57)	20 (26.56)	18 (25.10)
T <sub>6</sub> - Scarification with H <sub>2</sub> SO <sub>4</sub> for 6 min	920	19 (25.84)	17 (24.35)	24 (29.33)
Mean	1098.71	15.57 (23.24)	26.57 (31.02)	13.71 (21.73)
SEd		0.359	0.744	0.329
CD(P=0.05)	0.770		1.597	0.707

(Figures in parentheses are transformed values)

clearly concluded that, soaking the glory lily seed in boiled water (100° for) 40 minutes had substantially improved the seed germination (62%) accompanied with longer seedlings production, dry matter production and vigour index (1680).

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