

## 4.7. SEED GERMINATION (Table 12)

### 4.7.1 *Alternanthera sessilis*

In *A. sessilis* 'Red', the mean percentage of seed germination was higher in the seeds obtained from the open pollination experiment although taller seedlings was recorded in the seeds obtained from the self pollination experiment (bagged inflorescence) (Mean percentage of seed germination and height of seedling: open pollination:  $81.00 \pm 19.97$  and  $1.25 \pm 0.20$  cm respectively; self pollination:  $51.33 \pm 32.83$  and  $1.49 \pm 0.47$  cm respectively). Statistical analysis could not be carried out since the collected data was not normally distributed (Appendix 4.7.1). The incubation period for the seeds collected from the open pollination experiment was shorter which was 2–7 days compared with 4–65 days for the seeds collected from the self pollination experiment. Out of the 12 seeds obtained from the self pollination experiment, 3 samples recorded an incubation period of 65 days and one sample each of 4, 7, 15, 27, 28, 51, 54, 63 and 64 days. After the appearance of the radicle, the cotyledons of the seeds obtained from the open and self pollination experiment took 2–5 and 1–5 days to fully emerge from the soil respectively.

In *A. sessilis* 'Green', the mean percentage of seed germination in the seeds collected from the self pollination experiment and those collected from the open pollination experiment was similar and not significantly different ( $p > 0.05$ ) (Appendix 4.7.2.1). The mean percentage of seed germination was  $75.56 \pm 26.10$  in the seeds collected from the open pollination experiment and  $76.92 \pm 20.87$  in the self pollination experiment. However, the seedlings were significantly taller in the seeds collected from the self pollination experiment ( $p < 0.05$ ) (Appendix 4.7.2.1). The seedling height was  $2.06 \pm 0.42$  cm and  $1.74 \pm 0.20$  cm in the self and open pollination experiment respectively. Similar to *A. sessilis* 'Red', the incubation period of the seeds obtained from the open pollination experiment was shorter which was 3–10 days and 3–35 days

for those from the self pollination experiment. After the appearance of the radicle, the cotyledons of the seeds obtained from both experiment took 1–5 days to fully emerge from the soil.

In the open pollination experiment, the seeds of *A. sessilis* ‘Red’ showed a higher mean percentage in germination. However, the seeds of *A. sessilis* ‘Green’ produced significantly taller seedlings ( $p < 0.05$ ) (Appendix 4.7.2.2). In the self pollination experiment, the seeds of *A. sessilis* ‘Green’ had a higher mean percentage in germination and taller seedlings compared to *A. sessilis* ‘Red’. However, the differences in seedling height were not significant ( $p > 0.05$ ) (Appendix 4.7.2.3.).

Meanwhile, the mean percentage of germination for the seeds collected from the cross pollination experiment was  $31.25 \pm 23.94$ . The incubation period was 8–64 days and the seedling height was  $1.53 \pm 0.47$  cm. All the seeds obtained from the open, self and cross pollination experiment show epigeal germination. The cotyledons emerged fully from the soil and spread out about two days after the appearance of the radicle (Figure 105 & 106).

#### **4.7.2 *Alternanthera brasiliana***

In the parent plants, the mean percentage of germination of the seeds collected from the open pollination experiment was  $46.67 \pm 18.26$  and the average seedling height was  $1.58 \pm 0.22$  mm. The incubation period ranged from 2–25 days. After the appearance of the radicle, the cotyledons took 2–4 days to fully emerge from the soil.

In the offsprings, the mean percentage of germination was slightly higher in the seeds collected from the open pollination experiment ( $76.67 \pm 13.69$ ) as compared with the self pollination experiment ( $75.23 \pm 24.14$ ). However, the difference was not

significant ( $p > 0.05$ ) (Appendix 4.7.2.4). In terms of seedling height, the seedlings from the self pollination experiment were also not significantly taller than those of the open pollination experiment (open pollination:  $1.14 \pm 0.23$  cm; self pollination:  $1.79 \pm 0.65$  cm). The incubation period for the seeds is roughly the same for both pollination experiments which is 9–26 days for the seeds obtained from the open pollination experiment and 3–25 days for those of the self pollination experiment. After the appearance of the radicle, the cotyledons took 1–5 days to fully emerge from the soil.

When comparing between the parent plants and offsprings, the difference in the mean percentage of germination for those seeds obtained from the open pollination experiment is not significant ( $p > 0.05$ ) (Appendix 4.7.2.5). Similarly, the seedlings from the seeds of the parent plants are also not significantly taller than the seedlings from the offsprings ( $p > 0.05$ ) (Appendix 4.7.3).

All the seeds show epigeal germination (Figure 107). Usually, only one seedling emerges from a single seed. However, two seedlings from a single seed has also been observed from seeds of the parent and offspring plants collected from both the open and self pollination experiments. This indicates that the seeds of *A. brasiliiana* are polyembryonic. During germination, two white shoots each with a radicle were seen. The cotyledons of the shorter seedling emerged fully on the second day. The cotyledons of the longer seedling only emerged fully on either the second or third day (Figure 108).