

**Primary study on biological characteristics of *Amphicarpaea bracteata*
(Leguminosae) amphicarpic seeds**

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Introduction

Amphicarpic, an adaptive trait whereby both aerial and subterranean fruits are formed on one plant, occurs in several plant taxa, notably the Phaseoleae legumes (Kumar *et al.* 2012). The subterranean fruits can retain offsprings in favorable parental microhabitats and protect offsprings from micro-environmental extremes, fire and herbivores or predators on the soil surface (Cheplick 1994). *Amphicarpaea bracteata* (Phaseoleae, Leguminosae) is a twining annual that widely distributed in East Asia and North America. This species produces both aerial and subterranean fruits. The objectives of the present study were to determine the morphology and germination behaviors of the amphicarpic fruits and to better understand ecological adaptive mechanisms of amphicarpic.

Methods

In October, 2012, fresh matured seeds of *A. bracteata* were collected from the Fragrant Hill (116°11'59.69"E, 39°99'131"N, 128 m a. s. l.) in Beijing, China. Ten groups of 100 seeds of each seed types were weighed to determine average seed size and mass. Seed moisture contents were tested according to the Rules of International Seed Testing Association (1985). Germination tests were conducted at daily temperature regimes of 15/5, 20/10, 25/15 and 30/20°C (light/dark, 12/12 h), representing the mean daily maximum and minimum temperatures at the natural habitats during different seasons. Germination was checked every 24h and germinated seeds were removed.

Results and Conclusions

The aerial and subterranean seeds differed in colour, shape, length, width, height, moisture content and weight (Table 1). The amphicarpic seeds had different germination behaviors. The germination percentage of fresh matured intact aerial seeds were less than 25%, and scarifying the seed coat markedly hastened germination and increased germination percentages (ultimately reached 100%). The germination percentage of the non-treated (fresh matured) subterranean seeds were less than 50%, which was lower than subterranean seeds that stored in moistened soil at 5°C for 1 month (near 100%, Figure 1). Our results indicated that the fresh matured aerial seeds were physically dormant but subterranean seeds were physiologically dormant. Future studies are required to investigate the germination ecology in field and the ecological role of amphicarpic seeds in regeneration of *A. bracteata* population.

References

- Cheplick G P. 1994. Life history evolution in amphicarpic plants. *Plant Species Biology*, 9(2): 119-131.
International Seed Testing Association. 1985. International rules for seed testing. *Seed Science and Technology*, 13: 299-355.
Kumar P S, Lawn R J, *et al.* 2012. Comparative studies on reproductive structures in four amphicarpic tropical Phaseoleae legumes. *Crop & Pasture Science*, 63(6): 570-581.

Table 1 Comparison of morphological characteristics, moisture content, and mass of aerial and subterranean seeds of *Amphicarpaea bracteata*

Type	Colour	Shape	Length(cm)	Width (cm)	Height (cm)	Moisture content (%)	Mass of 100 seeds (g)
Aerial seeds	dark brown	kidney-shaped	0.503 ± 0.013	0.406 ± 0.012	0.270 ± 0.009	7.948 ± 2.690	39.127 ± 0.6
Subterranean seeds	purple-brown	kidney-shaped or irregular spherical	1.107 ± 0.052	0.902 ± 0.045	0.614 ± 0.039	47.871 ± 1.131	475.498 ± 9.2

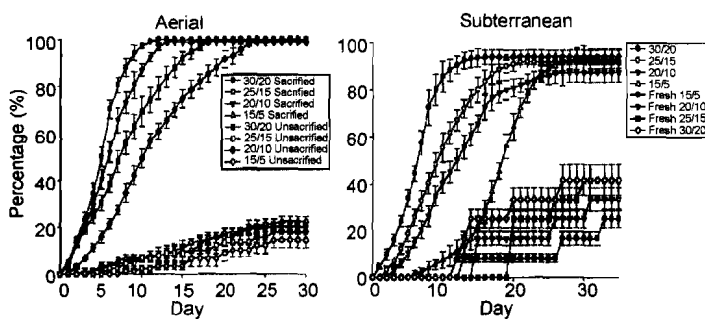


Figure 1. Germination percentage of aerial and subterranean seeds of *Amphicarpaea bracteata* at different temperature regimes.

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