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Effect of temperature and moisture on physical dormancy release in two populations of *Sophora alopecuroides*

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Key words: *Sophora alopecuroides*, physical dormancy, dry heat, wet heat

Introduction The seeds of most species of *Fabaceae* have physical dormancy which is broken by some unknown factors in the field (Baskin & Baskin, 1998). Present study simulated the humid and dry condition according to the natural situation-buried in the soil and on the soil surface, and set the temperature treatments according to the local temperature pattern.

Materials and methods Sixteen seeds of each population were cut in longitudinal direction and observed under 20X magnification with Olympus SZX12 Dissecting Microscope. Seed radius, seed coat thickness and hilum thickness were measured by Image-Pro Plus software with a calibrated scale. Four replications with 50 seeds each were taken from each population and subjected to one of eight treatments: four temperature levels factorial combined with two moisture conditions. For each population, the temperature used was: constant temperature 30°C, 40°C, 50°C, 60°C and the water content used was: 100 grams sand with different water content (0% and 5%) was enclosed in aluminum box and pre-treated in an incubator to the desired temperature, then plus the seed in the sand and mix together. After heating for two weeks, the seeds were extracted from the sand using a sieve. Germinated, damaged, intact and un-germinated seeds were counted. The intact and un-germinated seeds were put in the Petri dishes to do germination test at constant temperature of 25°C under dark condition. Seeds imbibed and not imbibed were counted after 14 days.

Results Dry heat significantly broke seed dormancy from Ejina County when temperature exceeds 50°C, but no effects were observed in seeds of Zuo County whatever temperature was used. Wet heat always showed more effective in breaking dormancy on seeds of Ejina County, but only treatment with higher than 50°C did significantly break seed dormancy for seeds of Zuo County. The percentage of dormant seeds of two populations was not significantly different only when temperature is 60°C with wet condition (Table 1). Seeds from Ejina County exhibited significantly higher thousand seed weight than that from Zuo County, but the seed radius did not show significant difference (Table 2). Seed coat was thicker and seed color was lighter in the seeds of Ejina County, and a significantly higher seed coat thickness beneath hilum was also observed in the seeds from Ejina County (180±5.8) than that from Zuo County (163±6.7) (Table 2).

Table 1 Percentage of dormant seeds after pre-treating with dry heat and wet heat under different temperature condition.

Populations	Dry heat				Wet heat				CK
	30	40	50	60	30	40	50	60	
Ejina	80a	69ab	51cd	54cd	60bc	45d	17e	10e	76a
Zuo	92a	92a	90a	87a	91a	91a	51b	13c	88a
P	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	0.004	0.727	0.001

Table 2 Comparison of morphology and anatomy of two populations of *S. alopecuroides*.

Population	Color	Seed radius(mm)	1000 Seed weight(g)	Seed coat thickness(um)	Hilum thickness(um)
Ejina	yellow	3.34±0.02	24.0±0.34*	48±2.7	180±5.8*
Zuo	brown	3.07±0.04	19.3±0.51	45±2.4	163±6.7

Conclusions Seeds of *S. alopecuroides* from two populations exhibit different requirements for dormancy breaking and show different dormancy release patterns, which may attribute to seed coat color and seed coat thickness beneath hilum. In addition, wet heat is identified as an important dormancy release mechanism in seeds of *S. alopecuroides*.

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Reference

Baskin C. C. & J. M. Baskin (1998). *Seeds: ecology, biogeography, and evolution of dormancy and germination*, Academic Press, San Diego, CA, USA.