

Supplementary files are accessible here [*\(https://doi.org/10.5281/zenodo.6483485\)](https://doi.org/10.5281/zenodo.6483485)

Alongside cross-range germination tests, a more comprehensive set of tests encompassing several published methods was also performed to ascertain the optimum germination outcome method. For details, see the appendix below:

Petri plate germination test (2017-18): AU seeds wrapped in wet tissue paper were stratified around -4°C for two weeks later, and the thermostat was incubated at 25°C with no visible germination. It may be because of short incubation or unsuitable ambient temperature. In next attempt protocol: Around 500 seeds were washed with 5% of Clorox bleach in water, soaked for 10 minutes followed a thorough wash and 24 hours of soaking in distil water in a petri dish. Water was changed two times during 24 hrs. Afterward, seeds were transferred into a perforated mess cloth embedded into a plastic zip bag with distil water wet coconut coir as a media. The bag with seeds were stratified for 30 days at around $\sim 10^{\circ}\text{C}$. The moistness of coir in plastic was periodically maintained by adding a little of distilled water, the germination was checked every 4th week but even after three months there were no clear sign of any sprouts. Possibly due to negative impact of chlorine on AU seed's germination. Alongside few more attempts with collected 'seeds of coexisting species' were performed but all with negligible germinations.

Table S1. Several combinations of growth conditions were evaluated in indoor and outdoor setting were procured from UK, Mecsek Hills, and a local hypermarket (henceforth, 'UK seeds,' 'MH seeds,' and 'AK seeds,' respectively). Cold and warm temperatures are 'bluish' and 'goldish', different shades of 'grey' depict three seed types, and treatment types are represented with shades of green and brown.

Name and Seed type	Treatment type scarification/stratification	Growth conditions (Cold)	Growth conditions (Warm)
UK15, 2015 UK N=75/soil type	~ 4 years at 4°C ,	$13 \pm 2^{\circ}\text{C}$, at $75 \pm 5\%$ RH, first week dark then light	$22 \pm 3^{\circ}\text{C}$, at $60 \pm 5\%$ RH, first week dark then light
Normal16 (no acid) MH collected (2016) N= 100/soil type	~ 3 years at $(10 \pm 1^{\circ}\text{C})$, then ~ 70 hrs at $0/4^{\circ}\text{C}$	$13 \pm 2^{\circ}\text{C}$, at $75 \pm 5\%$ RH, first month dark then light	$22 \pm 3^{\circ}\text{C}$, at $60 \pm 5\%$ RH, first month dark then light
Acid16 MH collected (2016) N=75/soil type	Same above, then - H_2SO_4 (25% V/V), for 10 & 15 minutes	$13 \pm 2^{\circ}\text{C}$, at $75 \pm 5\%$ RH, dark only	$22 \pm 3^{\circ}\text{C}$, at $60 \pm 5\%$ RH, in dark only
Mix16 (AU+CP+MU) MH collected (2016) N= 75/soil type	~ 3 years at $(22 \pm 3^{\circ}\text{C})$, then ~ 70 hrs at 4°C	$13 \pm 2^{\circ}\text{C}$, at $75 \pm 5\%$ RH, 12 h light	$22 \pm 3^{\circ}\text{C}$, at $60 \pm 5\%$ RH, 12h light

Arkad17 Bought 2017 Arkad N=100/soil type	4 months (22 ± 2 °C), 4 months (4 °C) Ref: Ernst (1979)	13 ± 2 °C, at $75 \pm 5\%$ RH, first week dark then light	22 ± 3 °C, at $60 \pm 5\%$ RH, first week dark then light
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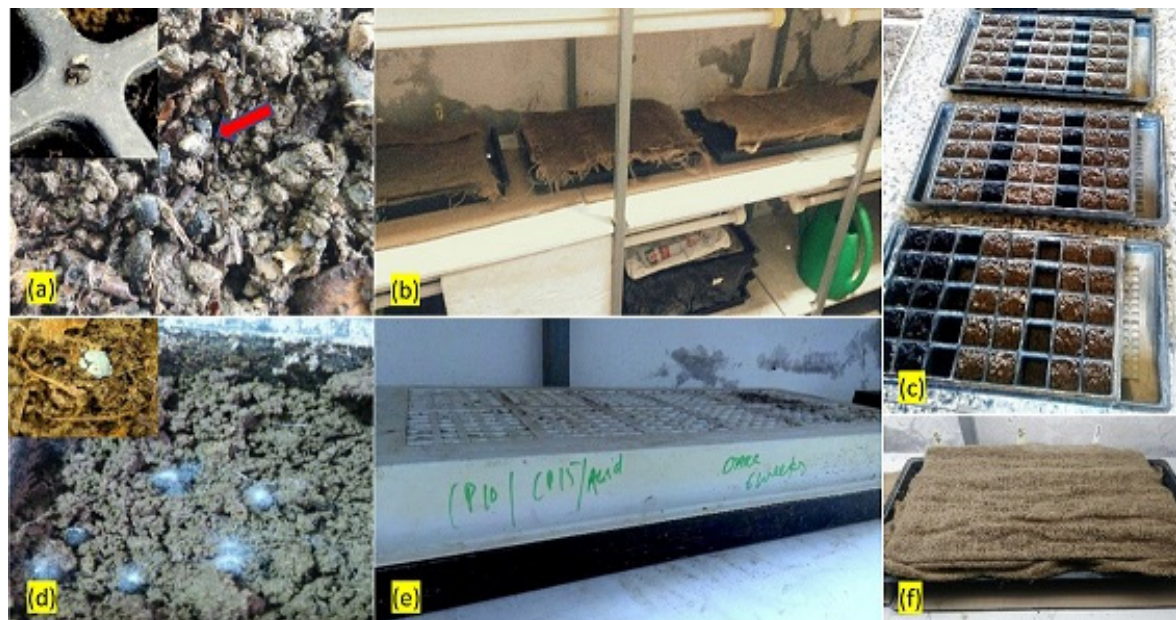


Figure S1. Layouts of round 2 germination settings: **a)** AU seeds after germination (see red arrow and enlarged in inset); **b)** Cold and covered treatment; **c)** open and warm treatment; **d)** various fungal infections; **e)** dark and cold treatment; **f)** cold and dark treatment, black polythene was used to block the light.

Results: Although the germination conditions were remarkably similar to that of various ecological conditions mentioned in published protocols, and the experiment has same forest soil and native seeds also. Still despite all efforts, the germination percentage among the different soil types was not optimum ($<50\%$) preassembly due to double dormancy of AU. Surprisingly, none of the setups results reached the desired optimum germination percentage preassembly due to tough physical and physiological double dormancy (Baskin and Baskin 2014).

Soil chemical analysis: 5g soil (in triplicate) was allowed for overnight stay for KCL treatment. Approximately 500g of nine soil samples from different sites were portioned out for further chemical analysis. Viz. PH, and soil types.



Figure S2. Different soil samples in triplicate are checked for its PH (left image), and for soil type by Arany method.

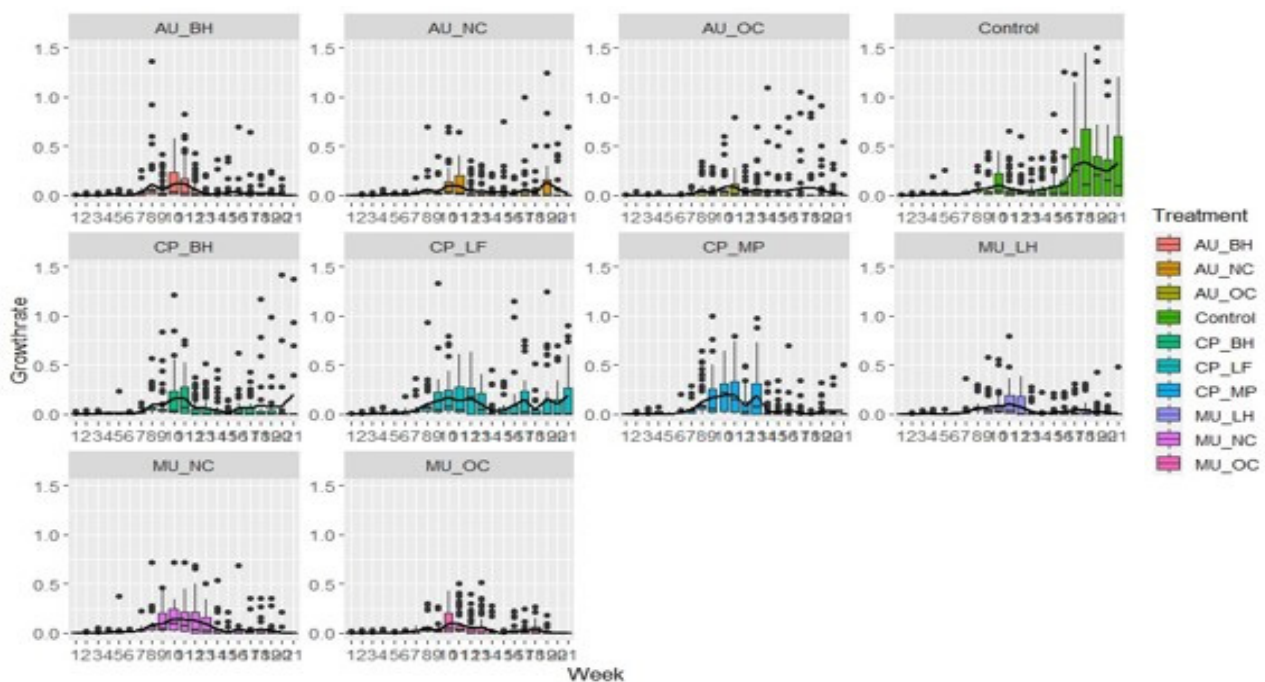


Figure S3. Boxplots show weekly AU growth rates in various soil types. Overall, 10 & 11th weeks had the growth maxima in common among soil types except *control*. AU soils (AU_BH, AU_NC, AU_OC) had a shorter intensive development period mostly on 10 & 11th weeks. CP soils (CP_BH, CP_LF, CP_MP) and MU soils (MU_NC and MU_OC) had an 8–13th week range for maximum growth, while exceptionally CP_LF reflects a maximum in the 9–13th week in addition to 17th & 21st week also. And MU soils share a 18th week unusual growth peak. *Control* had intense development period after the 16th week until the end of the experiment (week 21) except a short 10th week pulse.

*Legend: AU – *A. ursinum*; CP – *C. pilosa*; MU- *M. uniflora*.

References

Baskin CC, Baskin JM (2014) *Germination Ecology of Seeds with Physical Dormancy*. *Seeds*, <https://doi.org/10.1016/b978-0-12-416677-6.00006-8>