

Kincaid's Lupine

CPOP Listserv Discussion

Kincaid's lupine seed dormancy requirements.



Summary

In November 2014, Amy Bartow emailed the listserv to describe very high germination rates (80% within two weeks) for Kincaid's lupine following mechanical scarification. In her experience, previous lots of Kincaid's lupine seed had required about 8 weeks in a cooler before germinating, with sporadic germination continuing for months. She wondered whether more aggressive scarification methods would improve germination and asked for input from others who had experience with this species.

Steve Erikson replied that in his experience with many species in the Lupine genus, the primary dormancy mechanism is a hard seed coat that can be broken through scarification, softening or potentially heat, but that some species or individuals may require cold treatment. David Perasso agreed, adding that he had not found any lupine species that require cold dormancy. Tom Kaye (Institute for Applied Ecology) replied with a similar pattern to Amy Bartow – Kincaid's Lupine seeds had previously required cold stratification but now seemed to germinate more rapidly. He added that in other species, the need for cold stratification has varied by year, even within the same wild populations, and noted that other researchers have found effects of environmental conditions on dormancy rates. David Perasso added that many variables play into seed germination rates and that scarification should be verified by soaking seeds in water overnight to see if they swell up.

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Original CPOP Listserv Messages

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November 6, 2014 – Amy Bartow

I've grown Kincaid's lupine from seed many times, and it seemed that the seeds needed scarification plus a cold-moist stratification to induce germination in the spring. There is usually a pulse of germination after about 8 weeks in a cooler, then seeds sporadically germinate over the next few months.

We are growing a large amount of plants this year, so we used a mechanical scarifier (a westrup, lab sized brush machine fitted with a sandpaper drum) to scarify the seeds. Then the seeds were sown into containers, moistened, and placed in a cooler. Within a couple weeks, almost all the seeds had germinated! We are growing 3 different lots of seed from various counties within the Willamette Valley (collected over many years, between 2008- and 2014), and 2 lots of seed that were grown out at local farms in seed increase programs. Germination was ridiculously high on all the seeds lots, probably 80% (which is WAY higher than we've ever seen).

Three of the seed lots we recieved were also used by the sustainable prisons program. Seeds were scarified with our mechanical scarifier, then the seeds were sown into containers and left in an unheated greenhouse the first week in October at their facilities. Within a week, 50% germination was noted. Within two weeks 80% germination had occurred.

I've never seen seeds of this lupine germinate immediately, maybe we never used an aggressive enough scarification, until this year. What are other's experiences with this species?

Amy Bartow

November 6, 2014 – Steve Erikson

My general experience with lupines is that the primary germination inhibition mechanism is the hard, impermeable coat. Allow moisture penetration (i.e. through stratification

softening the seed coat, scarification, and heat also, maybe) and they germinate fairly promptly if the temperature is warm enough. This includes *L. albicaulis*, *arboreus* and *arboreus* hybrids (nasty weed), *latifolius*, *polyphyllus*, *rivularis*, an edible lupine from Italy, and the annuals *L. densiflorus*, *bicolor*, and *polycarpus*.

So they're dormant, but the dormancy mechanism is the hard seed coat. But I wouldn't be surprised if there was also some secondary dormancy that required cold treatment. It just may not be universal in any given population.

-Steve
The Zena Forest
Willamette Valley Oregon

November 7, 2014 – David Perasso

I totally agree with Steve. I have grown 15-20 species of lupins and found that none required a cold dormancy. Scratch the seed coat and they germinate. Usually there's a percentage that germinate without scarification — maybe a genetic mechanism that produces a few with cracked seed coats to make sure that some germinate each year.

The hard seed coat helps them remain in the soil until there's a fire. Lupin seeds last a long time in the soil, similar longevity to scotts broom :-)

David

November 10, 2014 – Tom Kaye (Institute for Applied Ecology)

Hi Amy and all,

A few years ago we did some experiments with Kincaid's lupine to explore its dormancy breaking requirements, and found that seed scarification combined with cold stratification was needed to get seeds to germinate in the lab. I'll attach that paper for your reading pleasure - ;). Recently, as in this year, we've seen germination happening much sooner than expected, just like you have found. Seeds placed in soil out doors have germinated within a few weeks. So apparently there are no hard and fast rules with this species.

I've seen the need for cold stratification come and go in species before, such as with *Abronia umbellata*, which did not need cold stratification, then one year the seeds would not germinate with the standard protocol, and we had to retool - and found that the seeds now needed cold! And this was from seeds from the same wild population, just different years. Some researchers

have found that the environment in which seeds mature can affect dormancy rates, and this may be at play here with Kincaid's lupine, who knows.

Several years ago I also compared the need for cold stratification in various native lupines, and found much inter-species variability in the need for cold stratification. Some needed it, some did not. Carl Eliot et. al. found wide variation in dormancy breaking requirements in three native legumes and his paper is open source and available at <http://www.bioone.org/doi/full/10.3955/046.085.0223>.

Interesting discussion!

Tom

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November 10, 2014 – David Perasso

Harvest time, seed moisture content at harvest, storage time and storage conditions affect dormancy requirements for many species. I'm wondering if the variation in cold requirements that you observed might be attributable to one of those variables.

I'd also be curious to know how you verify that the scarification was successful. I usually test my lupin seed after scarification by soaking a few in water overnight to see how many swell up. the percentage is quite variable, even with the same methodology, and if it's lower than 50% I rescarify until I succeed.

Finally, some species don't germinate if it is too warm. They may not need a dormancy, but they could be waiting for 50 degree weather vs 70 degrees. I could imagine that failure to germinate inside vs success outside would lead to a conclusion that cold dormancy was needed, when the seed was merely waiting for the right temperature.

I'm not saying you did any of these things, just that there are a lot of variables to consider.