SEED RAIN MONITORING AT ITEX SITES

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When scaling up ITEX monitoring to include community-level dynamics, the potential for recruitment of local and immigrant species from seed is one of the main issues. The seed source at any site is composed of two elements: the seed rain and the resident seed bank. The following chapter deals with the first of these, the seed rain (or, preferably, diaspore rain, since the technique allows us to trap all kinds of functional diaspores, such as seeds, bulbils, and fragments of mosses and lichens).

A well-established technique in arctic and alpine environments is to use non-sticky seed traps that do not need continuous care. The best material available at present is plastic grass-turf resembling door mats, e.g. AstroTurf™. Since we are interested not only in the local, autoctonous diaspore rain, but also in the current alloctonous influx of potential immigrant species in a warmer climate, larger traps than normal should be employed. I recommend the following design:

At each ITEX field site, set up a number (ten or more) of seed trap stations. Each station should contain four 0.5 x 0.5 m chunks of door mat located at the corners of a 2x2 m square. Also rectangular traps are OK if it saves material when cutting larger pieces of mat, provided that each individual trap has a surface of at least 0.25 m^2 (larger traps are fine, but less handy). The traps should be fastened to the ground with steel wire in the corners. The replicate station can be placed in different plant communities or along altitudinal transects (if present) at your site.

Most diaspore dispersal will take place in late summer / early autumn and during the winter. The traps should ideally be visited twice a year: as soon as possible after thawing (to catch the winter dispersal), and at the very end of the growing season. If only one visit is possible, make this directly after thawing. Gently lift the seed traps and bring them to the field lab. Dry the seed traps indoors for a day or so. When sampling the diaspores, turn the traps upside down over a dark cloth , paper, or plastic sheet. Tap the entire lower surface gently with a hammer. Gather all particles in a paper bag (one bag per trap). If diaspores still stick in the trap, use a clean brush. Replace traps at the stations immediately.

Identification of diaspores is best made with a reference collection of diaspores from the area, collected from identified plants.. Once set up this can serve as reference for many years. After identification of the diaspores, they should be reported as numbers per m^2 and year. Germination tests can be carried out in filter paper in Petri Dishes at room temperature, but many arctic and alpine species need special treatment (e.g., hibernation, cutting, HCl-treatment) for germination, biasing the result. Seeds collected at the end of the growing season can be hibernated in the sample bags to improve germinability (except in a few cases where seed viability is extremely short, e.g., *Salix*). For this purpose, install a ”hibernation cabinet” at your site. We have used a plastic mailbox with drainage holes in the bottom and a padlock to keep the lid in place, attached to a pole just above the ground in a place where it stays entirely snow-covered through most of the winter. The sample bags are picked up at thawing, the seeds sown immediately. Such controlled natural hibernation gives better results than simulated hibernation in freezers.