GERMINATION OF GALIUM APARINE

Galium aparine is widespread in the temperate and Mediterranean areas of the Northern Hemisphere. It occurs naturally in hedgerows and is a major weed of rape and winter cereals. In some areas it can be a problem in spring sown crops. There are distinct genetic differences between populations. Populations growing in established hedgerows tend to germinate only in autumn and may be more sensitive to herbicides than field populations, which often germinate from autumn through to spring. Differences in the germination requirements of separate populations and even different seed batches is a problem to experimentalists, particularly in glasshouse experiments where germination is needed during the warm conditions of summer.

Galium aparine is often a problem to germinate in summer. It is believed to have an endogenous time clock which limits germination to autumn, winter and early spring. Also, its germination requires low temperatures. Low night temperatures may be particularly important. The same seed batch can vary over time from requiring darkness for germination soon after harvest to requiring light for germination of older seed. The species is notorious with glasshouse weed screeners for these reasons.

There are ways around these problems but different methods seem to work for different people (and different seed batches and at different times). The best approach is to try several batches of seed and several sets of conditions to see which works best for your seed batch and environmental conditions. Try the following:

8) *Galium* germinates better in soil than on artificial media such as filter paper. Aqueous extracts of soil are said to stimulate germination on artificial media.

1) Stir the seed into the top 2cm. of soil such that some is up to 2cm. deep and some on the surface. Place several trays or pots so prepared in a range of environments, with particular emphasis on cool or cold, shady conditions. Top water copiously and frequently.

2) Prepare seed trays or pots as above, water, then place in a cold room at 0C-5C. Do not let the soil dry out. At weekly intervals remove one unit and place it to germinate in light, preferably with temperatures fluctuating between 10C - 20C.

3) Soak seed overnight in running water at 60C, then sow and germinate at temperatures fluctuating between 5C and 20C.

4) Soak seed for 1 hour in a 3% solution of potassium nitrate. Drain but do not wash. Place in an open topped container in a refrigerator at 0C-4C for a week, then sow at temperatures fluctuating between 5C and 20C.

5) For field trials sown in warm soil where the *Galium* may germinate more slowly than other weed seeds, the *Galium* can be pre-germinated as follows; Soak the seed overnight in an aqueous solution of 1%-3% potassium nitrate (experiment with concentrations if possible). Drain but do not wash. Then put in an open-topped container in a cold room at 7C-10C for 1 week at the end of which the seed should have begun to germinate. This pre-germinated seed can then be

surface dried on cloth or filter paper and mixed with a small quantity of dry sawdust (to stop the seed sticking together) for sowing into field trials.

6) In summer, use Herbiseed's 'German potato field' population of *Galium aparine* which continues to germinate later into the summer than most other populations.

7) To overcome the endogenous time-clock problem, deep-freeze a batch of seed when it is germinating well in winter and use subsamples of this frozen seed during summer.

8) For regular glasshouse screening the pragmatic solution is to stock several completely different batches of seed, ideally from different populations. Use one of these batches while it germinates well. As soon as it shows signs of becoming dormant, test the germination of the 'reserve' batches and then use the batch which is currently germinating best. Store a duplicate of each batch as dry seed in a sealed container in a refrigerator as well as a batch at room temperature.

9) For field trials sown in late spring, we strongly suggest using Herbiseed's 'German potato field' population of *Galium*. This population originated from a farm where spring sown crops were a major part of the rotation, and a potato field planted in late April developed a high population of *Galium*. Herbiseed now grows this population from annual sowings of the untreated seed in late April to ensure that the population's capacity for germination in warm soils is maintained.

10) Herbiseed germination tests all its batches of Galium sown in a peat based compost in an unheated greenhouse each Autumn and Spring. The batches which germinate best are the ones which we sell in the following season. However, the interactions between the biology of the batch and the conditions into which it is sown are unpredictable. As an insurance policy, particularly for field trials sown in late Spring, you could consider sowing a mixture of several batches of the same species. This maximises the chances that the experimental conditions will match the germination requirements of at least one of the batches.

Finally, if you are having problems germinating any seeds, contact Herbiseed as soon as the problem appears. We will be happy to make suggestions aimed at permitting your experiment to proceed with the minimum of disruption. For instance, if a species has failed to germinate in a field trial, raking a new batch of seed into the trial could produce seedlings of the desired species within two weeks, not too far behind the other species in the trial, **provided that prompt action is taken.**

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