

## ACID TREATMENT OF SEEDS OF *CRATAEGUS MONOGYNA* AND OTHER *CRATAEGUS* SPECIES

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Is it worth growing hawthorn (*Crataegus monogyna*) from seed in the U.K.? Liners are always available in quantity from abroad, usually at unrealistic prices, whereas they are fairly expensive to produce here, with a necessity for regular sprays against mildew.

Points against imported plants are the chances of dried out roots, and problems developing where the liners have been raised on peat soils and have developed fine roots which do not transplant well on heavier soils. The quality is unknown until the plants arrive. There may come a time when imports are banned because of disease such as fireblight. So perhaps it is useful to know how to grow this utility plant, and a "home-grown" label may help to sell it.

From a smaller nurseryman's point of view, I have always had excellent sales of this plant, and by producing it myself can offer it at reasonable prices. For the smaller grower it is not worth buying in small numbers, and there is a self satisfaction of home-grown stock.

It is easy to produce a well-graded seedling of 45/60 cm in one year if attention is given to water, nutrients, sprays, and seed bed density. Mildew is little of a problem in the first year.

My reasons for adopting acid treatment for the seed is to reduce the pre-sowing traditional stratification period from 18 to 4 months with the acid treatment. Also there is a loss in viability with age, and imported seed could be more than one year old when it is received. In bad seed years one must rely on imports and resort to breaking down the seed coat artificially with mechanical abrasion or acid. It is advisable to collect two year's seed supply in good seed years.

By abrading the outer seed coat by 80 to 90%, a higher percentage germination is obtained, bearing in mind that with traditional stratification many seeds will not be sufficiently broken down by autumn to allow the ensuing chilling period to be effective. It is for this reason that the Dutch sow *Crataegus* seed at very high densities. Imported cleaned seed, artificially dried for lower postage, causes very hard seed coats. It may take up to two years normal stratification to get through, by which time seed viability is reduced. If the temperature is

raised many seeds are killed, as they have already been subjected to stress when artificially dried.

It is not necessary to be a scientist to undertake acid treatment, but common sense and general care are needed. Equipment required is concentrated sulfuric acid obtained through a laboratory supplier or a chemist, rubber gloves, overalls, shallow containers (plastic, glass or enamel), a thermometer,  $\frac{1}{8}$ " mesh sieve, and washing soda. The work area should have access to cold running water and a stone sink with plastic drainage pipes.

Small quantities of seed are easier to handle than large; I use 1 kg for each treatment, but can have many treatments going at once.

Seedcoat thickness in *Crataegus* can vary considerably from tree to tree and season to season. Trees can be picked separately or they can be mixed, with a representative sample taken for testing. Take four representative samples of 50 seeds each; samples must be clean and dry, placed in separate containers and labeled 1 to 4.

Note the time and add sufficient acid to coat the seeds so that they slide around easily when stirred without sticking or swimming. Give an occasional stir and if the temperature reaches 80 to 90°C either immerse the container in cold water or add more acid. Heating is not normally a problem if the seed is dry and the batch is not too big; keep the seed in the container flat and avoid splashing with water.

To test the effectiveness of the treatment, remove samples at  $\frac{1}{2}$  hour intervals from  $\frac{1}{2}$  hour to two hours after starting the acid soak. Cover the seed sample with water and then, using rubber gloves, rub the seed together and over the sieve to remove charred particles and to clean the seed. Rinse thoroughly and then immerse in clean water plus washing soda to neutralise the acid.

The next step is to inspect the seed by cutting open with a knife or secateurs and checking how far the acid has penetrated the outer coat. There should be 80 to 90% penetration in the majority of the seeds in one of the samples. It is possible for the acid to have reached the embryo, blackening it but still not affecting its viability. The acid usually penetrates through the joint of the two halves of the seedcoat, but sometimes there are weak spots where it may break through. At this stage the outer coat will appear much thinner and become very brittle.

Once an optimum treatment period has been established from these tests, one kilogramme batches can then be treated accordingly. In doing several batches at the same time, allow

15 to 20 minute intervals between batches to allow cleaning time. Occasional stirring is very important to prevent hot spots and give uniformity to the treated batch.

After the seed has been treated, cleaned, washed, and inspected and passed satisfactorily, it can be mixed with an equal quantity of moist peat and grit and given a warm period of two to four weeks at 20°C to break down any remaining parts of the seedcoat. This will also help to mature the embryo. After this, place the seeds in a polythene bag in a refrigerator for 10 to 12 weeks at 2 to 4°C, turning once a week to aerate and prevent mould development.

Ideally, give 10 weeks chilling then sow at the end of February or early March; this will finalize the chilling and the damp atmosphere is ideal for maximum germination. Frost damage is unlikely in our locality at that time.

I have found that *Crataegus monogyna* seeds require between 30 minutes and 2 hours acid treatment and *C. crus-galli* and *C. prunifolia* up to 4 hours. I treated a batch of imported seed of *C. coccinea*, received in late December 1981, and with a 2-hour acid treatment, followed by 4 weeks warm and 12 weeks chill treatment, achieved 80% germination.

## **PLANT STANDARDS FOR FRUIT NURSERY STOCK IN THE U.K. — AN UPDATED RESUMÉ**

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In my advisory career I have always found that economics are an extremely potent incentive for new technology to be adopted. If we take this point in the context of better quality fruit nursery-stock I am sure it is the improved results of using this certified stock which has led to its rapid acceptance by the industry.

At the recent "Fruit Focus Exhibition" in Kent, the Ministry of Agriculture's Fruit Certification Schemes were featured in the Agriculture Development and Advisory Service (ADAS) Exhibit and whilst I was there two very well known fruit growers were discussing the subject with me. One of them who has been around long enough to have known the situation prior to certification said, "John, it was like the Irish Sweepstake when we used to buy stock before certification standards put reliability and confidence into fruit production."