

# Improving germination of Heritage Round Pea Varieties

## Summary

Many older heritage varieties of peas have a tough seed coat that can lead to delayed or uneven germination. We wanted to investigate whether pre-germination treatments, such as soaking or scarification (abrading the seed coat) would provide a worthwhile improvement in germination.

Just over half of participants (57% for soaking, 61% for scarifying) noticed an improvement in germination, although many of these (26 – 33%) only noticed a very slight improvement. In reality these effects were quite small when measured, with both soaking and scarification reducing the time to attain 80% germination by *c* 1 day.

When asked whether they would soak or scarify pea seeds in the future, 32% of participants thought they might try soaking again, and 50% were quite likely or very likely to. Scarifying was less popular, with 53% saying they would definitely not try it again.

The small benefits gained from soaking and scarifying would suggest that, in most cases, they are not worthwhile, and more attention should be paid to creating optimum conditions for germination such as firm even seed bed, correct moisture levels and optimum temperatures (above 10°C for germination).

## Background

Many older round varieties of peas have a tough seed coat that can lead to uneven or delayed germination. A pea seed contains an embryo in a dormant state and a starchy food source. It is the rehydration of the starchy food source and the embryo which allows it to germinate. A hard seed coat can greatly slow this process, especially when the seed is in the soil where moisture may be unevenly distributed.

Soaking the seed in water, partially before planting outside can soften this coat, and also initiate the germination process, greatly speeding up emergence. This process is sometimes known as 'priming'.

Damaging or chipping away at the hard seed coat, can also remove barriers to germination. This process is known as 'scarification'. This can be done by mechanically abrading the seed coat with sandpaper or making a small nick using a knife or nail clippers. The latter is only practical for small numbers of high value seeds. The success of scarification, varies with the type of seed, but is commonly done to improve germination of legumes such as sweet peas. Care must be taken to ensure that abrading the seed does not damage the embryo.



## Varieties

We tested four heritage varieties:

- Espoir de Gembloux – a Belgian variety, producing a heavy crop of ‘melt in the mouth’ peas.
- Frueher Heinrich – a tall German variety producing very reliable crops
- Latvian – a vigorous tall and productive pea, which can be eaten without cooking
- Salmon flowered - compact plants with beautiful, bicolour pink flowers and small, sweet pods

## Aim of this experiment

The aim of this experiment was to investigate whether the pre germination treatments of soaking or scarification can significantly improve the germination of older heritage pea varieties.

## Methods

60 seeds were divided evenly into 3 groups of 20 and labelled as ‘Control’, ‘Soaked’ and ‘Scarified’

They were treated as follows:

- Control – no treatment
- Soaked – soak the peas for 12 hours in a plastic container with twice the volume of water to peas.
- Scarified – rub the peas for 1 minute between two pieces of sandpaper until the coat is visibly abraded, revealing the lighter tissue underneath.

After each treatment, the peas were sown at 1 cm depth in separate trays and labelled. All treatments were sown at the same time.

The number of peas germinated was recorded every day.

## Response rate

143 people signed up to do the experiment, of which 75 people sent back results, giving a response rate of 53%

## Results

The germination counts from participants were collated. The number of days after sowing (DAS) for the peas to attain 20%, 50% and 80% germination was then calculated.

*Table 1. Number of days to attain germination (average across 4 varieties)*

<b>Average days to attain</b>	<b>Control</b>	<b>Soaked</b>	<b>Scarifying</b>
20% Germination	7.38	7.22	7.02
50% Germination	8.15	7.66	7.58
80% Germination	10.09	9.24	8.85

On average, both soaking and scarifying reduced the time to attain 80% germination by c. 1 day. There was a small tendency for Salmon Flowered to respond less to soaking than the other varieties, but the differences were small and may have been an anomaly. Differences in responses of varieties to scarifying were inconsistent.

We also asked participants how much of an improvement in germination they perceived, using a scale from no improvement to a very large improvement.

*Table 2. Perceived improvement in germination*

% of participants	No improvement	Very slight	Quite large	Very large
Soaking	43	26	19	13
Scarifying	39	33	16	12

Just over half of participants (57% for soaking, 61% for scarifying) noticed an improvement in germination, although many of these (26 – 33%) only noticed a very slight improvement.

We also asked participants whether they would soak or scarify pea seeds in the future.

*Table 3. Would you soak or scarify peas in the future?*

% of participants	No definitely not	Might try it again	Quite likely	Very likely
Soaking	18	32	32	18
Scarifying	53	20	20	8

32% of participants thought they might try soaking again, and 50% were quite likely or very likely to. Scarifying was less popular, with 53% saying they would definitely not try it again.

## **Conclusions**

Both soaking and scarifying seed reduced the time to reach 80% germination by c. 1 day. Although this is a small improvement, 82% of participants thought that they might try or were likely to try soaking seed again. Scarifying seed generated similar improvements but only 47% of participants thought that they might try or were likely to try scarifying seed again. Many of the participants stated that they found scarifying fiddly and time consuming to do.

Although soaking peas resulted in slightly quicker germination, under some circumstances, it can also reduce germination. There is the danger it can result in the seed rotting if subsequent conditions are too damp and cold (Perry and Harrison, 1970). Also, if seeds

have been dried to a very low moisture content, soaking can reduce the viability of pea seeds to low levels (Ellis *et al.* 1990). Work by Olivier & Annandale (1998) showed that peas germinated most quickly between 20 - 30°C. The rate of germination slowed markedly below 10°C, so maintaining the temperatures above this minimum should be considered important to achieve optimum germination and minimise rotting and seed damage.

Scarifying can allow the seed to take up water more rapidly, but there is the danger that the embryo can be damaged either by the scarifying process or by imbibing water too rapidly (Rowland & Gusta, 1977).

The small benefits gained from soaking and scarifying would suggest that, in most cases, they are not worthwhile, and more attention should be paid to creating optimum conditions for germination such as firm even seed bed, correct moisture levels and optimum temperatures for germination.

## References

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