Breaking dormancy in yellow serradella seed

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ABSTRACT

The breaking of dormancy in yellow serradella seed was investigated by treating pod segments with combinations of boiling water and dehulling treatments. Results indicated that dormancy in yellow serradella seed could possibly be attributed to a combination of water-impermeability of the seed and the presence of a germination inhibitor in the pod walls. A simple treatment of immersing the pod segments in boiling water for one minute appears to be an effective treatment to overcome the dormancy in yellow serradella seed.

KEY WORDS

Dormancy, seed germination, yellow serradella.

INTRODUCTION

Yellow serradella (*Ornithopus compressus* L.) is an annual pasture legume suited for growing in sandy, neutral to acidic soil (2). Germination percentages of commercial seed have often been as low as 2 – 10% (5). This is due to hard seeds and possibly the presence of a water-soluble germination inhibitor in pod walls (1). However, it was found that over 95% of hard seeds of *O. compressus* cv. Madeira softened during the first year of burial (3). Dehulling of serradella seeds by means of a dehuller gave good results (4), but such equipment is not always available. In this experiment, the breaking of dormancy in *O. compressus* cv. Madeira seed were investigated by making use of dehulling and hot water treatments.

MATERIALS AND METHODS

Five replicates of 20 seeds of *O. compressus* cv. Madeira were subjected to the following treatments:

1. Control treatment where seeds were left in the pod segments without any treatment

2. Pod segments were scarified by opening one end with a sharp blade

3. Seeds were removed completely from the pod segments

4. Seeds were removed from the pod segments and immersed in boiling water for one minute

5. As in 4, but seeds were re-inserted into the pod segments after boiling

6. As in 5, but pod segments were also boiled for one minute before seeds were re-inserted

7. Untreated pod segments containing seeds were immersed into boiling water for one minute

8. Untreated pod segments containing seeds were immersed into boiling water for one minute and the seeds were then removed from the pod segments

Following these treatments, seeds alone (treatments 3, 4 and 8) or seeds in the pod segments (treatments 1, 2, 5, 6 and 7) were germinated in plastic petri-dishes containing two filter papers and 5 ml of a solution containing a mixture of captab and benomyl (0,055% and 0,022% m/v a.i. respectively). The petri-dishes were inserted into clear poly-ethylene bags and these were put into an incubator at a

constant temperature of 15 ?C under light conditions. The petri-dishes were inspected daily and all germinated or rotten seeds were recorded and removed from the petri-dishes. When the germination rate slowed, the remaining hard seeds were chipped with a sharp blade and incubated for a further five days. Germinated seeds were again recorded and removed. The remaining swollen seeds were tested for viability using the tetrazolium chloride viability test. From these data the total percentage of germination (before chipping), total percentage of live seeds and total percentage of dead seeds could be calculated. Treatment means were calculated using the MEANS statement of PROC GLM and comparisons between treatments were made using the LSD statement of PROC GLM of the SAS statistical program.

RESULTS AND DISCUSSION

Three treatments *viz.* Treatments 4, 7 and 8 resulted in the best germination percentages compared to the control (Figure 1). All three treatments involved boiling of the seeds. That can be attributed to the hard seed coats of the seeds. The significant difference between Treatments 2 and 3 is indicative of the presence of a germination inhibitor in the pod walls as was proposed by Barret-Lennard and Gladstones (1). The absence of a significant difference between Treatments 7 and 8 (as opposed to differences between Treatments 2 and 3) indicate that the boiling water treatment could have washed out some of the inhibiting substance or altered the chemical structure thereof. Two of the treatments *viz.* Treatments 5 and 6 resulted in a relatively high mortality rate compared to the other treatments (Figure 1). In both these treatments seeds were re-inserted into the pod segments after boiling. The handling of the small seeds by means of metal tweezers could possibly have damaged the embryo. It thus appears as if the dormancy mechanism of yellow serradella seed is a combination of water-impermeable seed and the presence of a germination inhibitor in pod walls. Dehulling the seeds by means of a mechanical dehulling machine (4) will greatly enhance the germination percentage of the seed. Where such technology is not available, boiling of pod segments appear to be an effective way of improving germination percentage.

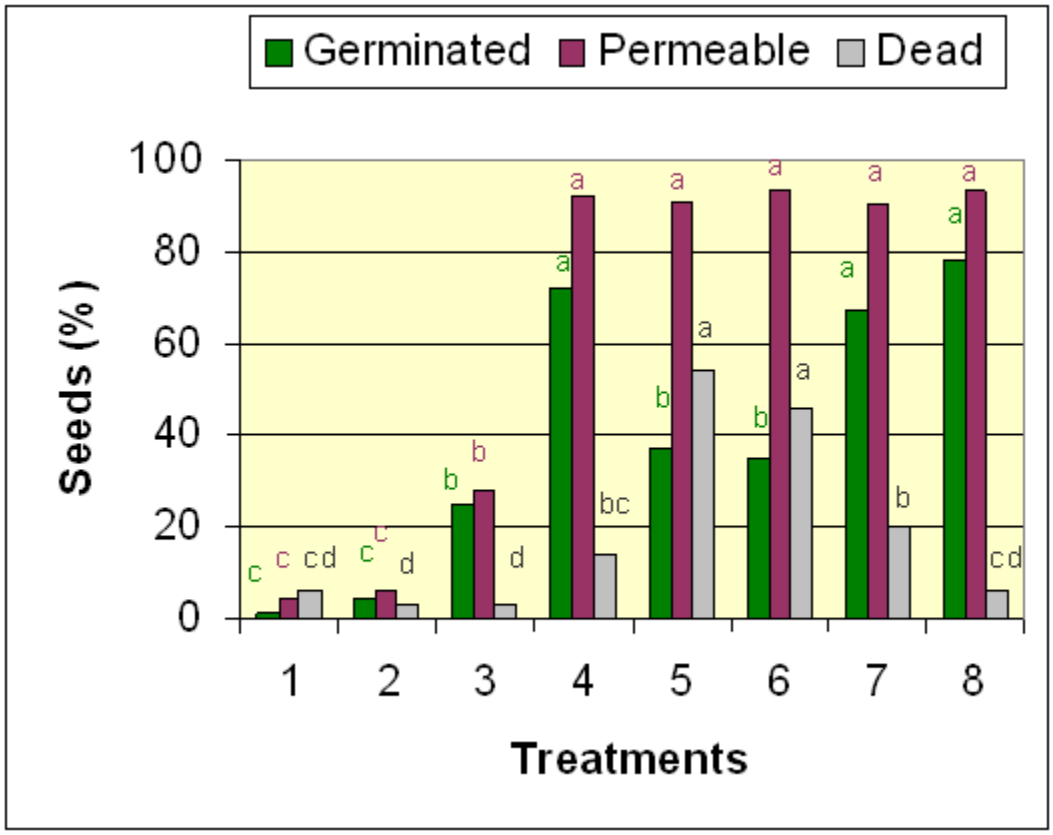

Figure 1. The effect of different treatments on germination, water-permeability and mortality of yellow serradella seed (Different letters of the same colour indicate significant differences at the 5% level between treatments in terms of that specific parameter).

CONCLUSIONS

It is clear that boiling of pod segments is an effective way of improving germination percentage of intact yellow serradella seed. The pod segments appear to play a role in inhibiting germination (compare treatments 2 and 3). However, the mechanism of inhibition and the effect of boiling water thereupon are still unclear and should be further investigated.

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