

Foraging Around



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Recent questions on hard seeds in legumes has prompted me to do a column on the subject. Frankly, the whole matter of hard seeds is complex. Hopefully, however, the following may help all of us to better understand what hard seeds are, and their role in agriculture.

Seeds that do not absorb water when placed in wet or moist surroundings, because of an impermeable seed coat, are referred to as hard seeds. In field crop seeds, the largest number of hard seeds are found in small seeded legumes such as alfalfa, red clover, birds-foot trefoil, and crownvetch. Hard seeds in general are viable or live seeds, and normally over time, do

germinate. However, because they do not take up water immediately when exposed to moisture, they are considered dormant or hard.

What Causes Hard Seeds?

Technically, "hardseededness" is credited to an impermeable layer either on or just under the surface of the seed, and while hardseededness is a generally characteristic of most small seeded legumes, there are differences among species and among varieties within species. Among the clovers, for example, ranked from high to low, species differ in their degree of resistance to becoming permeable as follows: white, ladino, alsike, red, crimson. Thus, hard seeds of red clover would become permeable and germinate sooner than hard seeds of white,

ladino, or alsike. And, while specific data are not available, I would expect hard seeds of red clover to also germinate sooner than those of alfalfa.

Speaking of alfalfa, we know that some varieties regularly develop more hard seeds than other varieties. On the other hand, the same variety grown in different fields may show wide differences in hard-seed content.

Environmental conditions under which the seed is grown are a major factor determining the percentage of hard seeds and the degree of hardseededness, with temperature during and immediately following maturity playing a major role. For example, hard seed percentages of 40 to 50 percent are common in alfalfa seed lots grown in Washington and other northwestern states, while alfalfa seed lots of the same variety grown in California seldom have more than a 20 to 30 percent hard-seed content. The impermeable layer is formed late in the seed development process. Thus, if growth is stopped abruptly, the impermeable layer may have limited time to develop fully. Likewise, drying of the seed, both in the field and in storage, seems to play an important part in the development of hardseededness.

The temperature and humidity of seed storage facilities also have a pronounced effect on hardseededness. High relative humidity during seed storage reduces, and in some legumes, prevents

formation of hardseededness that occurs in storage at low humidity.

How Is Hardseededness Reduced?

In the past, as much as 20 to 30 percent hard seed in legumes was thought to be advantageous in the event of poor or unfavorable weather conditions following planting, and this level is still considered okay under some conditions.

However, with alfalfa, at least most seedsmen prefer no more than 10 percent hard seed. Recent studies do indicate that with alfalfa late germinating seeds cannot compete well with established seedlings and new plants make only a minor contribution to improving stands. This would not be as true with red clover. Regardless, many authorities still feel that for most legume species, hard seeds can be, and are, very beneficial for filling in where old plants disappear.

The three most frequently used commercial methods to lower hardseededness are storage, blending, and scarification. As suggested earlier, normal storage from harvest to planting time will reduce hard seed percentages, although the exact results are unpredictable. Blending seed lots of the same variety produced in different areas is a common method of providing seed to the consumer with fewer hard seeds.

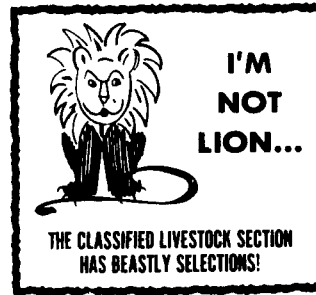
If necessary, the number of hard

seeds can be reduced by mechanical scarification. This occurs to some degree in the normal process of harvesting and cleaning seed. Beyond this, great care must be used to avoid over-scarification, and the danger of reducing germination and increasing the percentage of abnormal seedlings.

A high percentage of the hard seed coats also are made permeable by the normal freezing and thawing action of the soil during the winter following sowing, as well as by the action of soil organisms and soil acids.

Many other methods to decrease hardseededness have been investigated by researchers, and for species where hard seeds are a special problem, special techniques to reduce hard seeds can be and have been used by the seed industry. However, because of the risks involved, we do not recommend scarification on the farm.

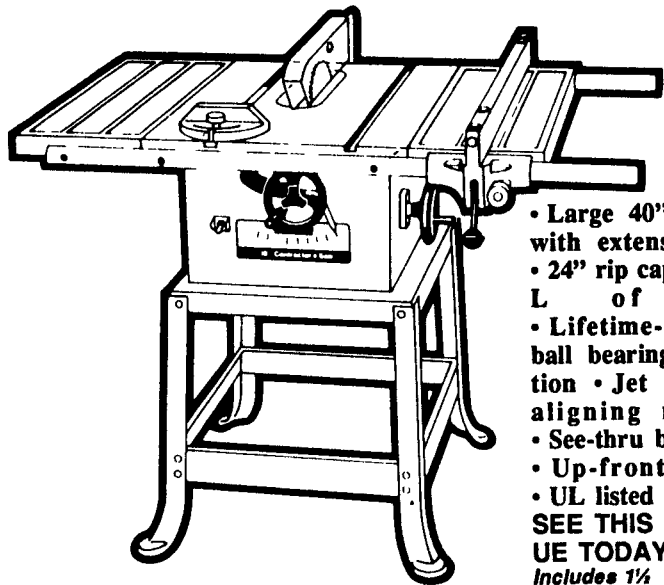
Hard seeds in small seeded legumes are common, but the mechanisms involved are complex. There are many factors that influence the percentage of hard seeds and the degree of hardness, and while excessive amounts of hard seeds, especially in alfalfa, may be a concern, we still feel that hard seeds can be, and are, very beneficial for filling in where old plants disappear.



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