

Cross pollination, the problem of seed production in Ryegrass

By Dr. Alan Stewart

Dr. Alan Stewart, is the Research Leader for the Ceres Research Station, PGG Seeds, Christchurch, New Zealand and is widely respected throughout the Plant breeding industry. Alan has some notable breeding successes such as Progrow and Missile annual ryegrasses, Tonic Plantain and Grouse Chicory to name a few. Alan has visited Western Australia a few times and is familiar with our climatic and growing conditions and Missile annual ryegrass is a result from those earlier visits.

Alan discusses the issues surrounding Cross Pollination or variety contamination in the following editorial.

“Pure seed production aimed at delivering the farmer authentic seed of a cultivar requires controlling a number of factors such as contamination, isolation and population shift. Failure to do so has the potential to seriously lower the performance of the resulting pasture”, says Dr Alan Stewart.

In Western Australia there are 3 common species of Ryegrass that are used for pastures.

- Wimmera or Annual ryegrass (*Lolium rigidum*) is the common annual reseeded each year on farms,
- Italian ryegrass (*Lolium multiflorum*) is a later flowering and more productive species, with some cultivars capable of persisting through moist or irrigated summer conditions.
- Perennial ryegrass (*Lolium perene*) is a true perennial capable of persisting over years in the south west's moist summer conditions

During flowering, these 3 ryegrasses all cross pollinate, crossing freely between all the 3 species and all varieties within the species. This means that pure seed must be produced under controlled conditions and be free of contaminants of all other ryegrasses. “This means in practice the field **must be free of ryegrass seed** in the soil, and that hay with seed in it should not be brought into the paddock, which is a normal practice on most farms”, says Alan. It also means that the paddock must be a minimum distance from other flowering ryegrasses, including those along the roadside and neighbouring paddocks. The paddocks are inspected to ensure contamination is insignificant. Seed can only be produced from areas free of ARGV.

It has been known for many years from seed production studies in the USA, Europe and New Zealand that population shifts can occur during seed production of a cultivar. To keep these shifts to a minimum it is necessary to carry out seed production under controlled conditions. To enhance seed quality Seed Certification Schemes have been put in place to ensure the farmer is getting seed of known origin and purity, and of an acceptable quality. For example in New Zealand this scheme goes back to 1928 and was introduced there to solve the problems farmers had buying perennial ryegrass seed but ending up with Annual types instead. Soon after this was introduced other countries adapted the scheme to assist their farmers. The scheme is now under OECD control and vital to farmers everywhere to ensure authenticity of cultivar and performance from the seed they purchase.

Where cross pollination does occur we could envisage a considerable shift towards earlier flowering if a late flowering cultivar is harvested in a climate where the summer drought comes early. In this case only the early plants would set seed and the resulting crop would be quite inferior to the original. This is referred to as natural selection. Such a shift could seriously change the pasture performance. If Tetraploid varieties are contaminated by diploids then cross pollination will result in genetic difficulties in the hybrids. "Many of the triploids will abort, lowering the yields as well as causing simple contamination", says Alan.

Great care is taken by breeders to ensure that the cultivars they bred are high yielding therefore of benefit to the farmer. To achieve this benefit it is essential that seed sown has been from certified or quality controlled production systems as outlined above. To do otherwise would not add value to the farming operation, and turn the production clock back a considerable number of years.

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