

Understanding seed, variability, environmental impact and management as factors influencing the success of pastures. (1) Forage seed.

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This is the first article in a short series that will cover the factors addressed in the title

In the times that we live in with restrictions not only from the weather but also from other influences on the farming production systems it is heartening to know that we are not the first farming group to face such problems, but that Jonathan Swift, just after the first farmers landed in South Africa observed the following:

Whoever makes two ears of corn, or two blades of grass to grow where only one grew before, deserves better of mankind, and does more essential service to his country than the whole race of politicians put together”

~ [Jonathan Swift quotes](#) (Irish Author and Satirist of prose, 1667-1745)

Often when one looks at animal production, there is a large factor that is not considered. This factor is that, however good an animal is, whether flesh or fowl, this animal will not produce without food. Food is the basis of animal production. One of the main factors to be considered in a production system is how we produce food /feed profitably.

One of the most cost effective ways to produce feed, for especially ruminants, but now also for other free range animals, is pasture. To understand pastures one must, like for animals, study their source or “blood line”, and this is found in the knowledge of seed and its origin.

Forage seed

Successful pastures depend on:

- *Establishing a partnership with your agricultural advisor, which must also include a large factor of trust, that he will give you good advice.*
- *Seed bed preparation, most pastures fail due to inadequate seedbed preparation.*

- *Good management of the pasture.*
- *Good climate /environment, soil type, which can be altered by irrigation.*
- *Providing for the nutrient requirements of the pasture crop.*
- *The use of adapted pasture cultivars.*
- *Limited variation within cultivar.*
- *But the most important is: Good Management, which eventually means that the farmer must value the crop and its function in the animal production chain.*

Pastures sometimes fail and the question is asked. "Why do pastures fail"? Ask the Farmer and depending on the relationship that I spoke of earlier between farmer and advisor the most common answer will be: POOR SEED

If we are realistic we must look at this problem holistically and ask "Why do pastures really fail?"

- *Poor seed bed preparation is one of the major factors. Good contact between seed and soil is essential as only with good contact can moisture be made available to the seed and will germination be ensured.*
- *Wrong cultivar for the specific environment. We will discuss this specific factor in a later article on cultivar environment interaction.*
- *But mostly: Poor Management*

Pasture establishment

This can be done vegetatively by using cuttings like often with kikuyu, or more generally by using Seed.

We will focus on seed and its properties

The origin of seed is determined by the method of reproduction that the plant uses:

This can be by sexual reproduction or, asexually through a process called Apomixes

Sexual reproduction can be: by Self pollination or by Cross pollination.

In both cases seed is formed as a result of the fusion of male and female gametes which forms an embryo and eventually a seed.

Asexual seed formation

Apomixis is the process by which seeds develop without fertilisation. This takes place when the megaspore mother cell does not undergo meiosis or a cell from the nucellus develops into the embryo. Therefore the apomictic seed is in fact a clone of the mother plant, and variation is zero, just as if cuttings were used.

Some plants have a combination of sexual and apomictic seed formation and thus limited variation can be expected as the sexually produced seed have genetic contributions from both the male and female parents.

Many forage grasses rely on apomixis for seed production, for example, *Eragrostis* (Weeping lovegrass) and *Themeda* (Red grass). Apomictic seed formation can vary from high (98%) of seed produced by the asexual apomictic process, to low (5%) of seed apomictic. In a suitable environment apomictic seedlings will thrive and soon form the bulk of the population. However, when the environment changes or a disease infection occurs the whole population can be affected.

Self pollination

Most self pollinating crops have very little variation and can be very cultivar/environment specific. After a cross is made between self pollinating parents we see a very rapid fixing of characteristics in the following generations and the variability reduces at a very fast rate. After four generations more than 90% of the characters will be fixed and the seed will produce a very homogenous population. This stabilises any characteristics that depend on management, disease tolerance, production cycles, seeding rate and time.

Cowpeas are a good example of a self pollinated forage species.

Cross pollination

When plants are cross pollinating the sexual process induces variability (adaptability to different environments) as a result of the combination of genetic material from different parent plants.

To form a stable cross pollinating cultivar the plant breeders needs to:

- Select for desirable characteristics, e.g. Disease resistance or growth habit.
- Form crossing blocks using the selected plants (not fewer than 30 plants per block).
- Produce seed from these blocks which are isolated from other stands of the same species. Then the progeny from seed of these blocks is again planted and the selection process is repeated. For 5 to 7 such cycles.

Use the seed that has been stabilised for the desired characteristics for pre-breeders seed, from which breeders seed and eventually certified seed is produced.

Do not use certified seed to produce seed for further use as variability will increase dramatically and could result in a shift away from desired characteristics, tolerances, etc.

Therefore one should know where seed originates from and what processes were involved in the formation of the seed. This will ensure that you will be prepared for the characteristics inherent to the type of seed that you are going to use in the establishment of your pasture.

