The development of a fodder radish suitable for multiple grazing, Ceres Graza

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Introduction

Despite wild radishes being a common weed of warmer climates the species possesses a number of very useful features. However, unlike the wide number of brassica forms available for grazing (Stewart & Charlton 2003) there has been very little breeding in radish to utilise this superior adaptation for multiple grazing purposes. The traditional fodder radish has a very limited use as it has prickly leaves and it was only possible to graze it once before it rapidly bolted to flower. There has clearly been a need for a type of radish comparable to the multiple grazing brassicas, rapes and leaf turnips.

Breeding History

The desired characteristics were found to be present in a number of radish germplasm lines and the process of combining these characteristics into Graza involved a series of complex crosses and selections over 17 year. These involved vegetable forms of radish *(Raphanus sativus)*, perennial seaside radish *(Raphanus maritimus)* and a palatable hairless backcross of radish with cabbage *(Brassica oleracea)* as described in Stewart & Moorhead (2004). Selection focused on palatable hairless leaves, a deep large forked root system with a low crown, multiple growing points from basal nodes, very late flowering habit and ability to regrow after grazing as well as healthy plants and acceptable seed yielding capacity.

Agronomic Potential

Under hot and dry conditions radish exhibit a more rapid establishment than brassicas, possibly in part due to their larger seed. In addition radishes generally exhibit superior tolerance to the turnip virus complex of turnip mosaic virus, cauliflower mosaic virus and beet western yellows virus which is a common problem on many brassicas.

Yields

In trials to date Graza has had comparable yields to brassicas over 3 grazings and that has persisted longer than both rape and leaf turnips. The yields at the early grazings appear to be less than leaf turnips as it partitions greater energy into its roots, but this is offset by its increased persistence allowing more grazings (Stewart & Moorhead 2004).

Graza is later to flower than other commercial radishes and when planted after early December few plants will flower prior to the following spring. However, when planted in early or mid-spring a proportion of plants may bolt to flower during the summer depending on the conditions. However, unlike leaf turnips these can regrow after flowering to provide useful leaf regrowth.

In NSW and southern Queensland Graza has been compared with Annual Ryegrass from April sowing and cut over the next 6 months. Its performance has been comparable to annual ryegrass until October when the radish flowered and produced a very high yield during this period. The radish failed to persist significantly beyond this period while the ryegrass continued to produce into November.

Graza has responded well to N applications, irrigation and to high fertility conditions (Jacobs & Ward 2004). Research on the fertility response is continuing as it is apparent that this species is likely to be more valuable under high fertility systems than under low fertility systems.

Quality

The quality of leafy Graza crops (13.3 ME) compares very favourably with leafy rape (13.2 ME) and leaf turnips (12.8 ME) as measured in NSW, and in addition sheep have preferred it over rape crops. In addition the levels of SMCO (S-methyl cysteine sulfoxide) in Graza radish is usually below that of brassica crops such as rapes and turnips

The effects of "moisture sparing" from grazing were monitored in detail by Warren Bond (CSIRO Land & Water) at the Marrar site where moisture sensors were placed at regular depths under the grazed and ungrazed Wedgetail treatments, as well as the Diamondbird spring wheat. Data from the sensors, which measure soil water potential, was logged automatically and uploaded to a CSIRO website daily, enabling viewing of "real time" water movement throughout the profile. The data showed the rate of water use in the grazed Wedgetail treatment slowed relative to the other treatments (which were similar) soon after grazing, due to reduced leaf. However the dry spring meant that this had little effect on total seasonal water use.

Animal performance on grazing wheats was also assessed last year through two additional trials at the Marrar site. The grazing preference trial was established to assess animal preference for one variety over another, in response to observations from producers. Lambs were given equal access to each of the 6 varieties over a 24 hour period. Dry matter recorded before and after grazing showed no significant difference in preference between varieties. Lamb liveweight and intakes were also measured in a larger scale trial on Whistler, Wylah and Wedgetail. Weight gains recorded over a 20-day grazing period averaged 215g/hd/day, with no difference between varieties. These lower than expected weight gains may have been due to the trial being understocked (20 lambs/ha), with lambs deterred by the bulk of feed available. Hugh Dove, CSIRO also measured feed intake of the lambs, averaging 1.25kg/hd/day, again with no difference between varieties.

The first year of Grain & Graze grazing wheat trials have shown significant benefits for grazing wheats in filling the winter feed gap, particularly those varieties with high dry matter production. The feed value of this dry matter, together with comparable grain recovery, means grazing wheats can provide superior economic returns to grain only wheats. This project will continue to 2008, incorporating further grazing management trials, as well as assessing a variety of short term pastures as additional options to help fill the feed gap.

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