Forages for a new climate

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Take home messages

- *In an extraordinary summer rainfall season (November 2010 to February 2011, Kerang received 374 mm), dryland forage crops yielded up to 30t/ha.*
- *Locusts and mice affected crop performance.*
- *After one year's results, sorghum and millet were better adapted than winter cereals, which did not survive.*

Background

Present indicators seem to suggest that climate patterns may be changing. Recent warmer winters and wetter summers are examples of this. As part of the Grain & Graze Project, DPI is trialling crops to see how they respond to different circumstances. Farmers may then choose between different options.

Three sites were selected across Northern Victoria: Kooloonong (dryland Mallee), Kerang (dryland but with the capacity to be irrigated) and Tungamah (dryland).

An immense range of potential crops and varieties could have been included in these trials. Possibilities ranged from traditional summer grasses such as millet and sorghum, winter cereals and new brassica hybrids to temperate and tropical legumes. If climate change brings more summer storms that may increase the chances of the crops surviving, crop choice widens accordingly. Originally, we intended to look at approximately 30 options, but sourcing seed is easier said than done, particularly for the legumes.

Another consideration is the cost of some of the options, and the chance that they will actually provide a return under dryland conditions. In hindsight, we may have been successful even in growing rice in the Mallee!

Aim

To trial both summer and winter crop types for their adaptability to dryland Northern Victorian summer growing conditions.

Previous work has looked at the persistence of winter cereals and lucerne, but has not considered a broad range of species.

Method

Given the seed availability and aiming to have a trial that was not too "blue sky", we selected the crop types/varieties for the three sites presented in Table 1.

Table 1. Crops, varieties and sowing rate of treatments in Summer Forages trial, 2010.

Crop Type	Variety	Sowing Rate (kg/ha)
Millets	Shirohie (Japanese) Millet	10
	French Millet (grain millet)	10
	Pearl Millet (grazing millet)	10
Sorghums	Forghum (forage sorghum)	10
	Pacer (grain sorghum)	10
	Maize	25
Winter Cereals	Hindmarsh barley	50 & 100
	Urambie barley (winter habit)	50
	Wedgetail wheat (dual purpose)	50 & 100
Brassicas	Bouncer (Hybrid brassica; turnip x chinese cabbage)	5
	Taurus (Dual purpose winter habit canola)	2
Legumes	Soy beans	50
	Mung Beans	30

The trials were sown on November 10 (Kerang), 11 (Tungamah) and 16 (Kooloonong) 2010. Rain fell on November 13 -14 2011 (30mm at Kerang). The plots were sown with 60 DAP kg/ha.

Locusts were sprayed at sowing (chlorpyrifos) and again approximately two weeks later (chlorpyrifos/fipronil mix). Unfortunately, many varieties were still eaten out by the locusts.

It was assumed that moisture at sowing would produce some sort of growth, but that the likelihood of significant follow-up rain was poor. The intention therefore was to harvest the plots immediately prior to plant death. As we all know, rain continued to fall, with the result that access to some of the trials became difficult during January.

For the period November to February, Kerang received 374 mm, Swan Hill 325 mm and Yarrawonga 528 mm.

Dry matter assessments were taken on 17 February 2011, as well as grain samples for the mung beans.

Soil samples were taken following harvest to ascertain N levels and available moisture.

Results

Final dry matter productions and grain yield of mung beans only, sampled and harvested in February 2011, is presented in Table 2. The data should be regarded with **caution** as there is a high degree of variability in the trial results. However, they can be used to give an indication of what can be grown with sufficient moisture, giving an upper benchmark for potential production. Where the table is blank, poor establishment/locust damage resulted in insufficient plants for an accurate assessment to be made. The millets and sorghum have not yet been harvested for grain.

Table 2: Final Dry Matter Performance and Grain Yield (mung beans only) of Crops Sown in November 2010 (t/ha).

Crop	Kooloonong	Kerang	Tungamah
Shirohie Millet			5.3
Pearl Millet	13.3		7.1
French Millet	3.7		
Mung Beans - DM	4.0	6.3	6.1
Mung Beans - Grain		0.9	0.4
Forage Sorghum	25.8	21.4	30.1
Pacer Sorghum	10.4	13.2	10.6
Sig. diff.	P<0.05	NS	NS
LSD (P<0.05)	12.1		
CV%	46.5		

Nitrogen and soil moisture levels at harvest in March 2011 are presented in Table 3. Not surprisingly, the soil nitrate levels were quite low under the high yielding crops and soil moistures were close to wilting point under all crops. Although mung beans are a legume, it would not be expected that they would contribute to the soil N until the plants are broken down.

Table 3: Final Nitrate (kg NO_3/ha and Soil Moisture (mm) levels at harvest in March 2011.

Crop	Kooloonong		Kerang		Tungamah	
	NO_3	Moisture	NO_3	Moisture	NO_3	Moisture
Pearl Millet	23	46	-	-	-	-
French Millet	-	-	-	-	17	76
Mung Beans	39	49	31	144	8	57
Forage Sorghum	8	33	15	144	<8	63
Pacer Sorghum	8	54	23	127	8	61

Interpretation

The winter crops failed to establish, most probably due to locust damage, and did not display the vigour of the summer crop types. The crop types that did survive - all summer growing crops - did remarkably well, given that the only nitrogen supplied was as 60 kg/ha DAP.

If you do grow summer forages or crops to utilise summer rainfall, you must take into consideration that soil nitrogen and moisture levels will be lowered, or even depleted, if you intend to sow the same land to a winter crop. In a different season with less summer rainfall, however, crops could have been harvested earlier, allowing more time for new moisture storage and breakdown of legume material preceding sowing in late autumn/early winter.

Commercial Practice

In practice, it is unlikely that forage sorghum would be left ungrazed as occurred in this trial, with the result that total dry matter production may not reach these levels. Feed quality would also be improved if it were grazed earlier.

Further evaluation of crops will be conducted over the summer of 2011/12, under what we can safely assume will be a different spring/summer conditions from the extreme events of 2010/2011.

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