



Perennial persistence linked to summer slumber

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As the impacts of climate change continue to drive research priorities, interest in the summer dormancy trait of cool-season perennial grasses is burgeoning.

Industry & Investment, New South Wales (I&I, NSW) research agronomist, Dr Mark Norton believes the trait could provide livestock producers with another tool to address the impacts of climate change.

The key limitations to pasture persistence in many southern Australian grazing systems are low rainfall and long, hot, dry summers.

Major perennial grasses featuring in our grazing systems include perennial ryegrass, phalaris, cocksfoot and tall fescue, which all express summer dormancy to some degree.

Better utilisation of the summer dormancy trait found in selected varieties within these species could enhance their resilience to increasing intensity and frequency of drought and therefore improve their persistence.

Dr Norton also observed that the development of a perennial wheat adapted to southern Australia might also require the use of a potent drought resistance trait such as summer dormancy, particularly where these crops would have to survive several months of dry conditions each year.

key points

- Summer dormancy could prove a valuable tool in tackling the impacts of climate change
- Most pasture species use a combination of traits to resist drought
- An international forum brought leading pasture researchers together to discuss the current state of play in summer dormancy investigations and developments.

According to Dr Norton, summer dormancy can be defined by four key criteria:

- Reduction and/or cessation of top growth
- Death and shedding of mature foliage
- Dehydration of surviving tissue (as is seen in cocksfoot)
- These behaviours occur even in the presence of adequate soil moisture.

A range of summer dormancy occurs and it is best expressed on a scale of 1 to 10 with 1 representing a fully summer-active type and 10, completely dormant.

“So far we have discovered dormancy across cocksfoot ranging from 1 to 10, in tall fescue from 1 to 8 and in phalaris from 3 to 8,” Dr Norton noted.

Most species use a combination of traits to resist drought with each trait expressed in varying degrees. For example, deep rooting is found across all phalaris whereas dormancy is relatively more important in cocksfoot. A key priority now is to develop compatible pasture mixtures that combine both summer-active and summer-dormant species.

“In this way we can produce fodder in response to rain during any season, while minimising competition between the pasture components,” Dr Norton explained.

Interest on a broader scale

Perennial cool-season grasses are the principal fodder for ruminant livestock in the world’s temperate pastoral systems. However, persistence of these grasses in Mediterranean-type environments on a worldwide scale is poor.

“As recent devastating droughts have wreaked havoc on livestock production in these types of climates across the world, interest in the summer dormancy trait, which is well adapted to the chronic water deficits characteristic of Mediterranean summers, is increasing,” Dr Norton explained.

LEFT: Researchers have discovered a significant range in summer dormancy expression across phalaris varieties. (Photo: Catriona Nicholls)

In this context, a meeting to present advances in knowledge of summer dormancy as a survival trait, seemed timely.

The *First International Workshop on Summer Dormancy in Grasses: Coping with Increasing Aridity and Heat under Climate Change* was held in Oklahoma, United States during April 2009. The Workshop convened a diverse group of plant physiologists, plant breeders, agronomists, and seed company representatives. Nine countries were represented including the US, Australia, France, Israel, New Zealand, Argentina, Morocco, Italy and the Netherlands.

The workshop featured presentations on FFI CRC research by Steve Clark and Zhongnan Nie, Department of Primary Industries, Victoria, Richard Culvenor, CSIRO and Mark Norton and Carol Harris, I&I NSW.

“The first workshop session dealt with biological aspects of summer dormancy,” Dr Norton said. “The second session exposed the nature of the stresses experienced by grasses in the US Southern Great Plains, southern Australia, and the western Mediterranean Basin. These talks also highlighted key plant traits with superior survival.

“The genetics, breeding and development of cool-season grasses for these environments (with the addition of Argentina) were then addressed in the second half of this session.

“The third session of the workshop examined the integration of summer-dormant grasses into land-use systems, targeting pastoral systems in Australia and the western Mediterranean.

“The final discussion session revealed priority areas for future research and communications to facilitate progress in the science of summer dormancy and the promotion of summer-dormant grass cultivars in their appropriate regions.”

It concluded with the establishment of a permanent international committee, with members representing broad skill areas. Dr Norton was elected as the chairperson. The committee will develop standardised evaluation techniques, terminology, measurements and protocols for different grass species across diverse regions; encourage synergistic research collaboration, and organise a second meeting to further the progress of improving grassland sustainability in the face of climate change.

The knowledge and contacts gained will help Australian researchers increase and improve the use of grasses with this trait, enhancing the survival and profitability of southern Australian grazing enterprises. ↓

More information

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