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Insights into spinifex (*Triodia* species) pastures and their management

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Abstract

Interviews about various aspects of spinifex pastures were conducted with 21 pastoralists, five Traditional Owners, and seven rangeland scientists from the Pilbara, Kimberley, and central Australia regions. Interviews sought to provide insights into spinifex pastures and covered topics such as plant identification, burning, grazing systems, tree/grass balance and Indigenous uses of spinifex and burning practices; knowledge gaps were also identified.

The interviews made it clear that fire plays a significant role in spinifex pastures and is frequently used to enhance grazing productivity by removing old or moribund spinifex and allowing palatable new growth to replace it. Additionally, fire is used as a tool for wildfire mitigation by creating different-aged fire scars and subsequent variations in fuel levels across the landscape. The amount of non-spinifex material in the diet of grazing animals was also commonly discussed where, after rain, cattle primarily grazed on a non-spinifex diet by selecting the soft fresh growth of annual and perennial grasses and forbs where available.

At the conclusion of each interview, interviewees were asked what additional information they would like regarding spinifex pastures and their management. The most common request was for accurate identification of spinifex species. Interviewees also wanted more information on the nutritional value of spinifex seed heads and leaves; specifically, how nutrient content and digestibility change throughout the year and between fire intervals. Additionally, they expressed interest in comprehensive information on various aspects of spinifex biology, including growth habits, reproduction, response to fire, and the formation of spinifex rings.

Introduction

Spinifex is the common name for a group of native perennial grasses (*Triodia* species) that are found in all Australian mainland states (Australian Virtual Herbarium 2024) and cover more than 25% of the Australian continent (Allan *et al.* 2002). Spinifex plants grow predominantly on soils with low nutrient levels and low

water-holding capacity. The genus *Triodia* consists of 65 species, all of which are endemic to Australia (Australian National Botanic Gardens 2024). A notable feature of many *Triodia* species is their ability to form a ring. A hummock is formed as the plant expands outwards via above-ground stolons. At some point the central growth may die and disappear leaving a distinctive ring surrounding a bare area.

Although spinifex covers a significant proportion of Australia (Fig. 1), there is limited readily available information on spinifex plants or the management of spinifex pastures in a pastoral context. The purpose of the interviews was to consolidate the collective knowledge on spinifex pastures and make this information available to land managers, pastoralists, Traditional Owners, extension officers, researchers and other interested stakeholders.

Methods

A total of 33 interviews were completed in April and May 2024; 21 with pastoralists, five with Traditional Owners, and seven with rangeland scientists. Due to the large distances and time constraints, all central Australian and rangeland scientist interviews were conducted by phone. Pastoral and rangeland scientist interviewees were asked a standard list of questions. In a small number of cases, interviewees chose not to respond to certain sections because of time constraints or their perceived lack of qualification. Of the five Traditional Owners interviewed, two were asked all interview questions, while the other three focused only on the aspects of spinifex and fire as relevant to Traditional Owners.

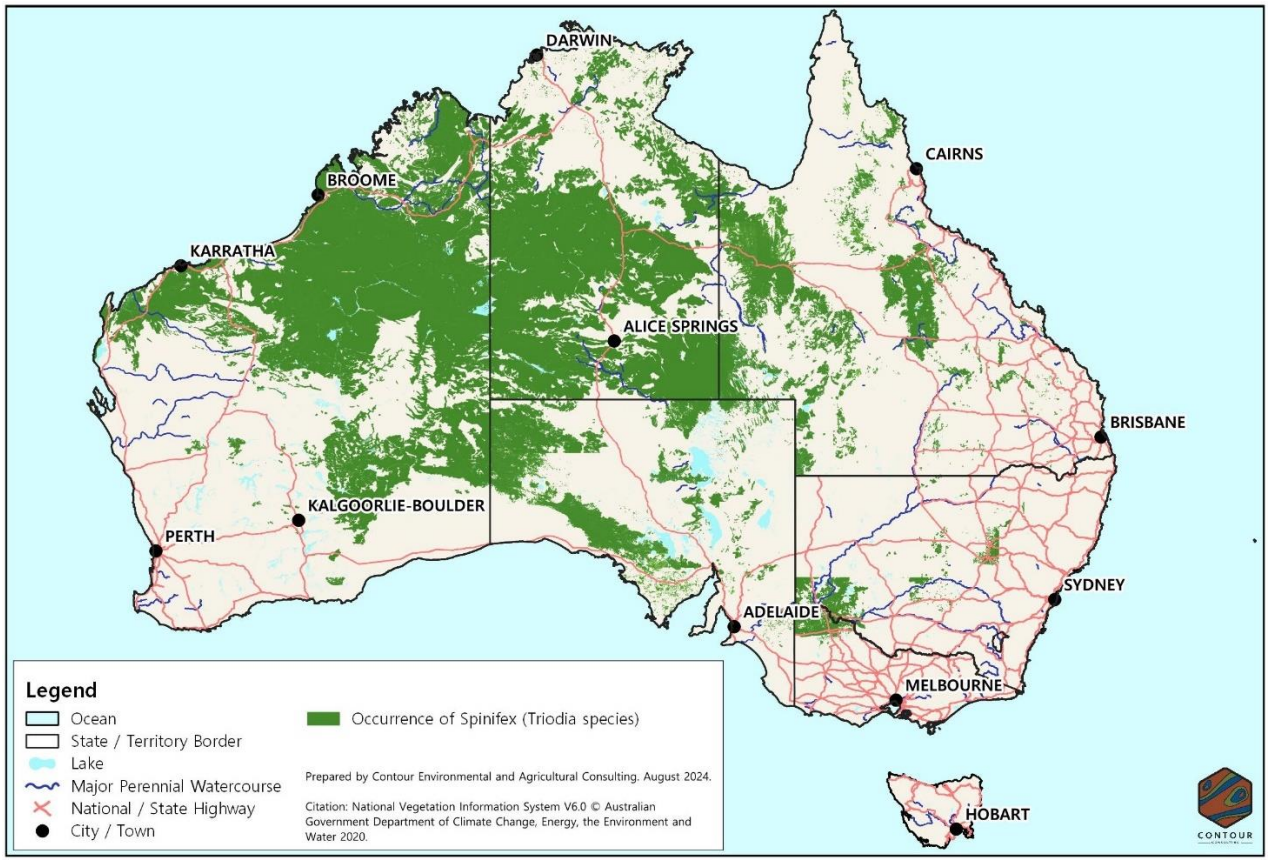

Fig. 1. Occurrence of spinifex (*Triodia* species) in Australia.

Results and Discussion

Interviewees generally referred to spinifex as being either hard or soft. Hard spinifexes included *Triodia basedowii*, *T. intermedia*, *T. irritans*, *T. secunda* and *T. wiseana* and soft spinifexes included *T. epactia*, *T. pungens* and *T. schinzii*. Hard spinifex foliage was generally considered unattractive to livestock at all stages of growth. In contrast, soft spinifex foliage is grazed by livestock and remains palatable for 3–4 years after fire, after which the feed quality deteriorates.

Spinifex and fire

Most of the interviewees preferred cool fires and emphasised the need for adequate soil moisture prior to burning. Burning after rain, when the soil and spinifex are well hydrated, is desirable because fire intensity is reduced. Importantly, pre-existing soil moisture also enables rapid regrowth of spinifex and any other perennial grasses that have not been killed by fire, typically within a week or two. Humidity was another key requirement for a cool fire. With high humidity, the fuel (particularly of cured pasture plants) absorbs moisture from the air. This increased moisture content renders the plant more difficult to ignite and slows down the rate at which it will burn. Consequently, fire intensity and its rate of spread is reduced.

In general, interviewees emphasised that they do not deliberately ignite hot fires; however, they often encountered them as a result of lightning strikes or unauthorised fires. Hot fires were typically associated with east/southeast winds, low humidity, dry fuel, and high temperatures from September to December and throughout the summer until sufficient rainfall has occurred. Many interviewees made efforts to avoid hot fires because areas affected by hot fires often take years to recover. The effectiveness of hot fires in killing spinifex, shrubs, and trees was frequently discussed.

The primary tool utilised for wildfire mitigation in spinifex is mosaic/patch burning. Creating variation in fuel levels through different-aged fire scars is considered the most effective method for mitigating wildfires. Not only does this practice minimise the risk of wildfires, it also rejuvenates the spinifex pastures by replacing old, dense spinifex with new growth. Essentially, to prevent wildfires, one must ‘combat fire with fire’.

Spinifex and grazing

Cattle congregate on burnt areas. The early growth is nutritious but not abundant, so cattle also need access to other bulk feed. Getting the proportions right around how much to burn or not burn is crucial. Burning areas that are too small can lead to excessive localised grazing, while burning too much can deplete feed reserves and affect areas that should be reserved for burning in following years.

There are more annual grasses and forbs present 1–3 years after fire compared with longer time frames of four or more years, and it seems the presence or absence of these species significantly influences productivity. Similarly, young spinifex plants aged 1–3 years contain a higher concentration of nutrients compared to older plants, aged four or more years. Additionally, the leaves are more digestible when actively growing than when dormant. Interviewees were aware of the benefits to animal performance provided by increased amounts of annual grasses and forbs and appreciated the importance of varying nutrient concentrations and digestibility of spinifex.

The practice of patch burning enables cattle to have access to spinifex at various stages of regeneration. This way, cattle may never need to graze pastures that are considered rank (4–6 years old), as there are always some available areas that have been burnt more recently (in the last 1–3 years). As a result, cattle may only graze areas of rank spinifex for a short time; grazing the seed heads for a couple of weeks each wet season.

Beef production

All pastoralists keep breeders in their spinifex country; mainly older cows that have had at least two calves. Where possible, weaners, steers, and heifers are moved onto the more productive buffel (Cenchrus spp.) and Mitchell grass (*Astrebla* spp.) pastures. Some interviewees can grow their cattle out on the more productive pastures of their lease, while others have farms in the agricultural areas of Western Australia, where all growing and sale cattle are transferred for finishing. A common response from those interviewed was that dry or spayed cows will fatten on spinifex, however wet cows or growing cattle will not.

Additional information needs

At the end of each session, interviewees were asked what further information they wanted on spinifex. While some were satisfied with their current knowledge, others had many unanswered questions. The most common areas of interest were spinifex identification, understanding nutrient mobilisation between rainfall and fire events, and a basic '101' introduction covering growth habits, reproduction, response to fire, and the formation of rings.

There was also interest in exploring whether non-spinifex species form the bulk of an animal's diet through faecal DNA sampling. Additionally, interviewees were keen to learn about cattle movement patterns across different aged fire scars and between seasons and the potential of high-density, short-duration grazing strategies to manage rank growth without relying on fire.

Conclusion

This work provides insights into spinifex pastures and their management and is based on 33 interviews with experienced practitioners from the Pilbara, Kimberley and central Australia.

Notably, fire plays a significant role in spinifex pastures and is frequently used to enhance grazing productivity by removing old or moribund spinifex and allowing palatable new growth to replace it. Additionally, fire is used as a tool for wildfire mitigation by creating different-aged fire scars and subsequent variations in fuel levels across the landscape.

The amount of non-spinifex material in the diet of grazing animals was a commonly discussed topic. Interviewees reported stock preferences for available annual and perennial grasses and forbs as well as browse species – predominantly wattles.

Many of the interviewees would like more information on spinifex identification, and nutrient levels relative to time of year as well as time since fire. There was support for developing a '101' of spinifex dealing with spinifex biology, response to fire, and other plants found in spinifex pastures. Over the next 3–4 years, the Kimberley Pilbara Cattlemen's Association proposes to address identified knowledge gaps and produce a more comprehensive and in-depth document outlining spinifex ecology and best practices for managing spinifex pastures.

It is envisaged that this report will provide industry, industry bodies, and government agencies with information to guide future research, extension, and development activities to benefit all those working with spinifex pastures.

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