Emerging summer weeds are spreading far and wide within Western Australian wheatbelt - a GRDC survey

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Key messages

- The most common roadside summer weed species were African love grass, fleabane, windmill grass and wild radish.
- Most summer weed species were present on roadsides at low densities. Further research is required in subsequent years to determine how summer weed density varies with rainfall.

Aims

Summer weeds carry disease, impede crop sowing and utilise stored soil moisture or nutrients that may otherwise be available to the subsequent crop (Cameron & Storrie, 2014). Identifying summer weeds informs growers of the major weed issues in different agronomic regions and provides direction for future research on emerging weed species. A GRDC funded project planned to survey roadside summer weeds in the Western Australian (WA) wheatbelt, from 2015 to 2017. This project aims to determine the prevalence and density of summer weeds, and highlight the variation between years. The results of the first year of this three year project are presented here.

Method

A survey was conducted over all main roads in the WA wheatbelt during February to April 2015. Sites were selected approximately every 10 km, where weeds were visible on the roadside. At each site, weed species were identified along a transect (20 to 50 m long, depending on weed density). Weed density (seed head or tillers for grass weeds and plant numbers for broadleaf weeds) was determined by visual assessment. Density for each species was recorded as low (0-10 plants/m²), medium (11-50 plants/m²) or high (>50 plants/m²). At each site, the growth stage was recorded for each species (seedling/rosette, flowering, seed set) and photos were taken to allow late identification of ambiguous species. Some species could not be differentiated. For example, native grasses were placed in a single category as they are difficult to accurately identify and are not weeds. Obviously native grass species that are common weeds (i.e. windmill grass) were not included in this generic category. Several species could not be accurately identified as they were at the seedling stage. These unidentified weeds were removed from the data set, as plants that are seedlings over late summer/autumn are generally autumn/winter weeds rather than summer weed species.

Results

The survey identified 91 species at 1138 sites evenly distributed throughout the wheatbelt.

Table 1: The number of survey sites in each agricultural region or over the entire wheatbelt, and the frequency of the four most common weed species in each region.

<table>
<thead>
<tr>
<th>Region</th>
<th>Number of sites</th>
<th>Four most common species (and percentage frequency)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern agricultural region</td>
<td>186</td>
<td>Fleabane (18%) African lovegrass (12%) Couch (9%) Wild radish (8%)</td>
</tr>
<tr>
<td>Central agricultural region</td>
<td>698</td>
<td>African lovegrass (9%) Windmill grass (6%) Wild radish (6%) Fleabane (6%)</td>
</tr>
<tr>
<td>Southern Agricultural region</td>
<td>222</td>
<td>African lovegrass (12%) Sowthistle (10%) Fleabane (9%) Stinking lovegrass (9%)</td>
</tr>
<tr>
<td>South east agricultural region</td>
<td>32</td>
<td>African lovegrass (22%) Windmill grass (16%) Fleabane (13%) Native grasses (9%)</td>
</tr>
<tr>
<td>Total wheatbelt</td>
<td>1138</td>
<td>African lovegrass (11%) Fleabane (9%) Windmill grass (7%) Wild radish (6%)</td>
</tr>
</tbody>
</table>
Over the entire wheatbelt, the most common species were African lovegrass, fleabane, windmill grass and wild radish (Table 1, Figure 1). African lovegrass was evenly distributed throughout the wheatbelt. Fleabane incidence was greatest in the northern agricultural region. Windmill grass was more prevalent in the central and south-east agricultural regions. Wild radish was most prevalent in the northern and central agricultural regions.

Figure 1: Maps showing the incidence of African lovegrass, fleabane, windmill grass and wild radish within the wheatbelt.

There were 26 weed species with a total frequency of greater than 1% at the 1138 sites (Table 2). However, most species, regardless of their frequency, were present at low densities at each site. Only African lovegrass, wild radish, couch, wild oats, capeweed and ryegrass were found at high densities at any site.

Table 2: The weed species with a total frequency of greater than 1% across all survey sites, the frequency of each species (i.e. percentage of survey sites at which each species was found), and the density of each species (i.e. percentage of survey sites at which each species was found at a low, medium or high density).

<table>
<thead>
<tr>
<th>Weed species</th>
<th>Frequency (%)</th>
<th>Density (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
<td>Medium</td>
</tr>
<tr>
<td>African lovegrass</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td>Fleabane</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Windmill grass</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>Wild radish</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Stinking lovegrass</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Couch</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Sowthistle</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Roly poly</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>
Stinkwort  3  2  1  
Wild oats    3  1  1  1  
Capeweed    3  1  1  1  
Afghan thistle  3  2  1  
Afghan melon  3  3  
Caltrop  2  2  1  
Nightshade    2  2  
Prickly paddy melon  2  2  
Panic grass    2  1  1  
Matricaria    2  1  
Button grass  2  1  1  
Crab grass    2  1  1  
Ryegrass    1  1  1  
Rhodes grass, feathertop  1  1  
Tar vine  1  1  
Mullamulla  1  1  
Paterson’s curse   1  1  
Prickly lettuce  1  1  

**Conclusion**

Wild radish, fleabane, windmill grass and sowthistle have been identified as problematic weeds in prior surveys (Michael et al, 2010). As a result, they are the subject of current integrated weed management projects in WA (GRDC project UA00149 and UA00156). Wild radish, in particular, is common in the northern region, and has dramatically increased in the central region over the past 15 years, possibly due to the spread of resistant populations (Borger et al, 2012; Owen et al, 2015). The prevalence of wild radish in both summer and winter surveys highlights that this is one of WA’s most severe weed problems. The summer cohorts will not produce as much seed as the winter cohorts, but wild radish seed can remain dormant for over five years, so it is vital that no additional seed enters the seed bank (Cheam, 2006). However, applying herbicides to wild radish cohorts in summer as well as winter will exacerbate the development of resistance. It is clear that there is an urgent need to focus research on economically desirable integrated weed management programs for wild radish, which aim to control this species throughout the year.

African lovegrass is a major summer weed on WA wheatbelt roadsides and is also a weed of long term pastures, although it is not a common weed of cropping systems. This species may require further research to adequately control it. However, there has been considerable research into the control of this species in the Eastern States, some of which is applicable to WA (NSW Department of Primary Industries, 2015). Couch and stinking lovegrass were also major weeds in the northern and southern agricultural zones of WA and may require further research for optimal control.

Matricaria infestation is increasing on the WA roadside (anecdotal reports also show that infestation of this weed is increasing in paddocks). Feathertop Rhodes grass is a serious concern in the Eastern States, and is common to the central and southern agricultural regions. Other invasive weeds such as stinkwort, roly poly, prickly paddy melon and prickly lettuce were also prevalent on the WA roadside with greater frequency in the central agriculture region. Nightshade and prickly lettuce pose a risk for invasion of cropping areas. Most of the weeds recorded in this survey have the capacity to invade cropping regions, but infestation of summer weeds depends on timing and frequency of summer rainfall. As a result, subsequent surveys are required to determine which species are occurring most consistently.

**Key words**

Summer weed survey, African lovegrass, wild radish, fleabane, windmill grass.

**Acknowledgement**

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References

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