Declared Plant Policy

Skeleton Weed (*Chondrilla juncea*)

Skeleton weed is a deep-rooted perennial weed established in the cereal growing areas of South Australia with the potential to spread rapidly and seriously reduce the yield of cereal crops.

**Management Plan for Skeleton Weed**

**Outcome**

- Negative impacts of skeleton weed on production minimised in rotational broad acre cropping and irrigated pastures.

**Objectives**

- High priority outbreaks in generally uninfested areas destroyed.
- Large outbreaks in generally uninfested areas contained and reduced in density.
- Seed dispersal prevented in generally uninfested areas.
- Impact of skeleton weed reduced in generally infested areas.

**Implementation**

Within areas generally free of skeleton weed,

- Natural Resources Management (NRM) authorities to ensure high priority infestations, as determined by the authority, on private or public land are controlled.
- NRM authorities to control high priority infestations on road reserves and recover costs from adjoining landholders in accordance with regional management plans.
- NRM authorities to ensure large infestations are contained by property-level management plans.
- NRM authorities to ensure contaminated seed and fodder are not brought into or distributed within their regions.

**Regional Implementation**

Refer to regional management plans for further details.

<table>
<thead>
<tr>
<th>NRM Region</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adelaide and Mount Lofty Ranges</td>
<td>Manage sites</td>
</tr>
<tr>
<td>Alintjara Wilurara</td>
<td>Monitor</td>
</tr>
<tr>
<td>Eyre Peninsula</td>
<td>Limited action</td>
</tr>
<tr>
<td>Kangaroo Island</td>
<td>Destroy infestations – regional alert</td>
</tr>
<tr>
<td>Northern and Yorke</td>
<td>Monitor</td>
</tr>
<tr>
<td>South Australian Arid Lands</td>
<td>Limited action</td>
</tr>
<tr>
<td>South Australian Murray-Darling Basin</td>
<td>Manage weed</td>
</tr>
<tr>
<td>South East</td>
<td>Manage sites</td>
</tr>
</tbody>
</table>
Declaration

To implement this policy, skeleton weed is declared under the *Natural Resources Management Act 2004* throughout the whole of the State of South Australia to minimise further spread. The movement or transport of the plant on a public road by itself or as a contaminant, or sale by itself or as a contaminant, is prohibited.

NRM authorities may require land owners to control skeleton weed plants growing on their land. NRM authorities are required to control plants on road reserves and may recover costs from the adjoining land owners.

Skeleton weed is declared in category 2 under the Act for the purpose of setting maximum penalties and for other purposes. Any permit to allow its movement or sale can only be issued by the Chief Officer pursuant to section 188. Under the *Natural Resources Management (General) Regulations 2005*, the transport or movement of grain for milling or wool for cleaning is exempt from the operation of sections 175 and the sale of wool or grain is exempt from section 177(2) if at the time of the sale the person believes on reasonable grounds that the purchaser will remove the plant from the wool or grain before any re-sale.

The following sections of the Act apply to skeleton weed throughout each of the NRM regions noted below:

<table>
<thead>
<tr>
<th>Sections of Act</th>
<th>Region</th>
<th>AMLR</th>
<th>AW</th>
<th>EP</th>
<th>KI</th>
<th>NY</th>
<th>SAAL</th>
<th>SAMDB</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>175(1) Prohibiting entry to area</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>175(2) Prohibiting movement on public roads</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
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</tr>
<tr>
<td>177(1) Prohibiting sale of the plant</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
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</tr>
<tr>
<td>177(2) Prohibiting sale of contaminated goods</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>180 Requiring notification of infestations</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>182(1) Landowners to destroy the plant on their properties</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>182(2) Landowners to control the plant on their properties</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>185 Recovery of control costs on adjoining road reserves</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

Review

This policy is to be reviewed by 2020, or in the event of a change in one or more regional management plans for skeleton weed.

Weed Risk

Invasiveness

Flowers of skeleton weed produce seed automatically without any need for pollination. One plant can annually produce 20,000 to 30,000 seeds. These are well adapted for dispersal by the wind, and are also easily transported in wool, fabric, machinery, vehicles, railway trucks, and contaminated hay or chaff.

There is little dormancy in seeds of skeleton weed, so germination usually occurs soon after seed is shed, as soon as sufficient moisture is available in autumn. Seeds will germinate with as little as 5 mm of rain; the seedlings require three to six weeks of soil moisture to establish successfully, and can develop a taproot to 1 metre deep by the following spring.
They can establish among competition from pasture or relatively undisturbed native vegetation.

Impacts

Skeleton weed is a pest of broad acre crops, pastures and occasionally roadsides. It reduces yields through competition for moisture, nitrogen and light, and has a high cost of control. Yield losses of up to 80% have occurred in densely infested cereal crops, and the wiry flowering stems can even make harvesting difficult.

It is poor fodder for cattle and can out-compete other pasture plants. However, carrying capacity for sheep may be improved by the presence of skeleton weed presence because it provides green summer fodder. In rotational systems, its impact on crops far outweighs its benefit in pastures.

Potential distribution

Skeleton weed is suited to semi-arid or Mediterranean climates, but will grow in other climates under suitable conditions. It is found primarily in areas receiving more than 300 mm mean annual rainfall. However, since it can regenerate repeatedly from deep roots, it is not limited to sites regularly receiving this rainfall but can afford to miss dry years and recover in wet years. It is tolerant of waterlogging and any levels of frost that occur in South Australia.

Skeleton weed has an advantage on deep sandy soils where its root system can exploit deep soil water resources, but can grow competitively in a wide range of soil types and is suited to the majority of the arable areas in the State.

Feasibility of Containment

Control costs

To prevent the spread of skeleton weed, seeds and roots must not be moved from infested areas. As wind dispersal of seed is important, seed set should be prevented where possible. Sheep can be useful minimising spread if placed in infested paddocks from October to November before the weed flowers. Continuous grazing will not kill the plant, but it will prevent the development of flower heads and seed production.

Herbicide control of skeleton weed is easiest in a wheat crop. If possible it is recommended wheat be sown in large infestations, with barley or oats the next best options. Lupin crops should not be used as they are highly susceptible to damage by any herbicides useful for managing skeleton weed.

In pastures, seeding with annual or perennial legumes can provide significant competition to minimise the spread of skeleton weed.

Co-ordinated containment programs, especially on light soils, have encountered problems from the long-term persistence of herbicide in soil leading to risk of erosion. There is a specific need for alternative control strategies for large infestations on light soils.

Persistence

Skeleton weed seeds have little dormancy and are short lived. They usually germinate within six months and no seed bank is formed. The root system is long lived, enabling individual
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Skeleton weed plants to survive for many years. It also enables mature skeleton weed plants to regenerate from deep roots, making them more difficult to kill.

Current distribution

Infestations of skeleton weed are scattered throughout the Mount Lofty Ranges, Mid North, South East and Eyre Peninsula regions. The weed is more widespread in the Mallee and Riverland regions.

State Level Risk Assessment

Assessment using the Biosecurity SA Weed Risk Management System gave the following comparative weed risk and feasibility of containment scores by land use:

<table>
<thead>
<tr>
<th>Land use</th>
<th>Weed Risk</th>
<th>Feasibility of control</th>
<th>Response at State Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crop-pasture rotation</td>
<td>high 116</td>
<td>medium 32</td>
<td>protect sites</td>
</tr>
<tr>
<td>Irrigated pasture</td>
<td>high 105</td>
<td>medium 42</td>
<td>protect sites</td>
</tr>
<tr>
<td>Grazing-rangeland</td>
<td>low 22</td>
<td>very high 11</td>
<td>monitor</td>
</tr>
<tr>
<td>Grazing - southern</td>
<td>low 31</td>
<td>low 61</td>
<td>limited action</td>
</tr>
<tr>
<td>Native vegetation</td>
<td>low 38</td>
<td>medium 40</td>
<td>limited action</td>
</tr>
</tbody>
</table>

Considerations

Skeleton weed was introduced to New South Wales by 1897 when it was detected in Wagga Wagga and had spread to South Australia by 1947. Attempts at eradication programs commenced immediately, but were unsuccessful due to lack of effective control techniques. It had spread to the Upper South East, Eyre Peninsula, Yorke Peninsula and Northern areas by 1965. It has still not reached its ecological limits in South Australia, as several decades of intensive management have successfully delayed its spread. It has potential to establish and cause losses throughout the cereal areas, especially in the lower rainfall zones.

Chondrilla juncea is an aggregate of many agamospecies (clones that reproduce by non-sexually produced seeds). At least three of these agamospecies occur in South Australia, and their distribution has implications for biological control. Several of biological control agents were introduced in the 20th century and reduced the density and impacts of the commonest form of skeleton weed in heavily infested regions. However, a consequence has been an increase in the relative abundance of two other forms that are less susceptible to these agents.

Risk assessment indicates site protection as the appropriate action at State level in rotational cropping and irrigated pastures, and monitoring in rangelands. While sale and movement are prohibited uniformly across the State, regional actions vary according to the land uses in each region. Co-ordinated control programs are not conducted in areas where skeleton weed is widespread and there are few benefits from enforced control. However, all regional NRM Boards retain the power to enforce control actions if necessary.
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On Kangaroo Island, skeleton weed is a regional alert species and infestations are destroyed when detected. The South Australian Murray-Darling Basin aims to manage the weed, and the South East and Adelaide Mount Lofty regions aim to manage sites.

Skeleton weed is monitored in the Alinytjara Wilurara and Northern and Yorke regions. Only limited action is undertaken in the Eyre Peninsula region where control is normally left to the judgement of landowners.

Synonymy

*Chondrilla juncea* L., Sp. Pl. 796 (1753)

Taxonomic synonyms:

- *Chondrilla angustissima* Heg. Schw., Fl. Schw. 762 (1840)
- *Chondrilla graminea* M.Bieb., Fl. Taur.-Caucas. 2: 244 (1808)
- *Chondrilla latifolia* M.Bieb., Fl. Taur.-Caucas. 2: 244 (1808)
- *Chondrilla rigens* Rchb., Fl. Germ. Excurs. 271 (1832)
- *Chondrilla virgata* J.Presl & C.Presl, Delic. Prag. 116 (1822)

Other common names include devil’s grass, gum succory, hogbite, naked weed, and rush skeletonweed.