# BIOLOGY AND CONTROL OF AFRICAN RUE, *PEGANUM HARMALA*

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*Summary.* African rue, *Peganum harmala*, a herbaceous perennial, has been found in several locations in South Australia. A large infestation occurs in semi arid pastoral lands near Orroroo where the plant occupies both ruderal sites and sites receiving run-on water. It is not considered to be a serious weed. Reasonable control can be achieved using glyphosate or imazapyr herbicides. The current knowledge of African rue is reviewed, based on information from the literature, from observations of the species in South Australia and from research conducted in South Australia.

## NAME

*Peganum harmala* L., ZYGOPHYLLACEAE. In most of the English speaking world the accepted common name is African rue, although some cases refer to the plant as Syrian rue or harmal.

## DESCRIPTION

A detailed description is provided by Eichler (1). African rue is a herbaceous glabrous perennial, sprawling to erect, 30-80 cm high. Buds are at or near ground level and are borne along short subterranean perennial stems. Above ground portions of the plant completely senesce in early winter. Leaves are 2-5 cm long, alternate and divided several times into narrow spreading segments. Flowers are produced progressively along the stems in the leaf axils. Seeds shake from the ripe capsule. Squashed leaves and stems have a mild but rather unpleasant smell.

## HISTORY

African rue was first noted in South Australia near Tintinara in 1938 (5) and also on Minburra station, Orroroo in the late 1930's (Murray Catford, pers. comm. 1988).

African rue has spread considerably in the area of Minburra and Koonamore stations ($139^{o}15'E$, $32^{o}15'S$), a semi arid pastoral district, over a total area of 20,000 Ha. Isolated occurrences have been recorded elsewhere in South Australia and have normally been eradicated. It has been found at two sites in New South Wales (3) and one site in Victoria (11).

## HABITAT

African rue is native to the steppes and deserts of the Mediterranean region from Spain, northern Africa and Arabia through southern Russia to Tibet (1). This species is also found in the subtropical semi deserts of Pakistan and India.

In both South Australia and overseas African rue is generally confined to sites that are waste, disturbed or receive some extra water.

Guest (2), when describing the ruderal vegetation of Iraq, wrote that African rue was the 'ruderal plant par excellence' of the desert, being invariably found along caravan routes, near camping sites or in the vicinity of wells. Abandoned fields are commonly invaded, the species being a useful indicator of previous cropping (9, p.24).

In South Australia African rue grows densely in an intermittent lake on Koonamore station. On the surrounding loam plains, which receive an annual average rainfall of 200 mm, the plant is confined to depressions or patches that receive extra water, such as roadsides or natural drainage areas. In areas that are disturbed, such as stock water points, the plant becomes abundant. African rue seldom establishes on sites that are well vegetated.

As African rue is not palatable it may be the only plant growing in heavily grazed areas, or it may be in association with other plants that are not eaten.

African rue is capable of growing in a wide range of soils. It grows in most soil textures, from clay loams to sandy loams. Though extensive data is lacking preferred pH range seems to be from 8 to 9. Thalen (9,p.146) found the plant on soil ranging from nil salt to moderately strong salt of 4,800 ppm. African rue has been found in South Australian soils ranging from 0% to about 60% $CaCO_3$ by the N HCl method (8).

In sites where annual average rainfall is as low as 125 mm African rue is confined to places where some run-on moisture is available. It grows in regions that receive up to 480 mm annual average rainfall but is most commonly found in arid and semi arid areas.

African rue is not affected by extremely cold temperatures of -40°C over winter (10). A warm spring to autumn period is required as growth of established plants begins at 20°C (6).

## GROWTH AND DEVELOPMENT

Germination and emergence. Germination of African rue occurs when there are suitably moist conditions and the temperature is at least 18°C (6). Germination response of seed collected in South Australia was 96%. Seedling mortality in the field and in pots was very high. African rue seedling development is slow. Competition from other plants normally reduces the seedling population to nil. Seedlings could emerge if sown as deep as 30 mm, however, most seedlings emerged from the 0-5 mm range. Seedlings sown in commercial potting mix in spring had tap roots penetrating to 200 mm and above ground shoots to 150 mm long after 70 days. Some side shoots had formed and the stem had undergone secondary thickening (8). Seedlings that had not thickened failed to survive winter (Michelmore, unpub. data).

Perennial regrowth. The annual growth cycle of established African rue plants in South Australia starts in late August to early September. Growth of adult plants from the perennial subterranean stems in spring is very rapid. Ramets may sometimes emerge from lateral roots. Ramets do not produce deep tap roots and the root connection to the parent apparently remains intact. Broken roots are able to produce shoots (8).

Phenology. First flowers are normally seen in semi arid South Australia in late September. Flowering continues through to the cool weather of March-April, though fewer flowers are seen during the hottest period of mid December to late February. Fruits with fully formed seeds can normally be found one month after the first flowers are seen. A single large adult African rue plant at Koonamore station in March 1988 had 1123 capsules with a total of approximately 47,600 seeds produced in that growing season (8).

## IMPORTANCE

Detrimental. African rue has a bitter taste and is not eaten by stock. It has caused poisoning when it has been force-fed to stock (4).

On some areas of Minburra station African rue can be found with an above ground cover of up to eight percent (8). Little work has been done to determine the actual subterranean interference by African rue on desirable shrubs and herbs. Casual observations at Minburra station in August 1987, however, revealed that the majority of African rue roots are below 150 mm. This is a level where the root systems of the common fodder species of the area, *Sclerolaena patenticuspis*, *S. fontinalis*, *Dissocarpus fontinalis* and *Hordeum leporinum*, seldom extended (8). It is not known if removal of African rue from Minburra and Koonamore stations would improve animal production.

African rue has survived but has failed to thrive in cereal crops in South Australia. Losses have not been reported.

Beneficial. Unpalatable plants, such as African rue, are desirable at stock waters in arid areas as they contribute to lowering soil erosion.

Legislation. To prevent establishment in uninfested pastoral lands and to prevent small African rue infestations from affecting present and future land management options, African rue is a proclaimed plant in South Australia and Western Australia.

## CONTROL

Response to cultural methods. African rue can not be controlled by hoeing or grader blading.

Response to herbicides. Herbicides that kill the top growth or a small portion of the roots will not adequately control African rue as the plant will reshoot from its subterranean stems or from the remaining live roots. Glyphosate (360 g/L), applied by spot spraying 1 L in 50 L water onto dust free leaves during early flowering, will kill most plants. Spraying earlier, when plants are too small to absorb enough herbicide, or later, when there is less translocation, gave poor results (8).

Spot spraying African rue with imazapyr (250 g/L) has given very good control on roadways, roadside verges and in pastures (Michelmore, unpub. data).

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