DROUGHT FEEDING AND CONTROL OF YELLOW BURRWEED, *AMSINCKIA* SSP

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Summary. In separate incidents yellow burrweed, *Amsinckia lycopsoides* and *A. calycina*, was dispersed over 300 km from two sites in drought fodder. By investigating trade records, 2 new satellite infestation of *A. lycopsoides*, and 13 of *A. calycina*, which may have been missed in roadside surveys, were detected. New infestations were clustered but not around the source of seed. Where fodder was fed in a feedlot new infestations were easy to detect and limited to small areas. Early identification prevented further spread.

INTRODUCTION

In times of drought, fodder is transported over large distances, and carries many weed seeds(19). This does not mean the dispersed weeds reduce farmers incomes, the invaded site must be suitable for establishment (3) and losses must be incurred before it is considered a problem.

Co-ordinated weed control programs often concentrate on widespread weeds already established(14,15). The control of rapidly spreading weeds is difficult as it requires quick action based on limited information(21).

Weeds with a high spread rate are likely to be troublesome(12). The faster the rate of spread, the greater the justification for co-ordinated control(6). Species which establish at a number of isolated nuclei will tend to spread to occupy new areas at a rate faster than a species being dispersed from one location(4). With a spreading weed, destroying only 30% of new satellite infestations can greatly improve effectiveness of a control program(16). Early detection of new infestations is needed to ensure they are controlled prior to secondary spread(21). A shift of priorities from killing widespread weeds on roadsides to co-ordinated programs involving extension, liaison and strategic enforcement to reduce externalities caused by spreading weeds has been advocated(1,3,15,20) but has been difficult to implement (18).

Surveys are important for finding invading weeds but only limited areas can be covered(21). Inspections working progressively from known foci along roads and searching particular habitats are efficient(21).

YELLOW BURRWEED

Yellow burrweed, *Amsinckia* spp. is an aggressive competitor with crops and pastures (7,9,11,13,17).

The Eyre Peninsula region of SA is isolated from other agricultural areas by semi-arid land and sea. It remains relatively free of yellow burrweed(8). *A. calycina* was first recorded (as *A. hispida)* in 1965 although this infestation was eradicated (Alcock unpub. record). In 1975 two properties were infested with *A. calycina*. In 1985 *A. calycina* was recorded on 17 properties(8). *A. intermedia* was recorded on Eyre Peninsula for the first time in 1989(Cooke pers. comm.).

The spread rate depends on the suitablity of the invaded site for germination and establishment (5). The soils and farming systems of much of Eyre Peninsula suit yellow burrweed. The major

potential cost to Eyre Peninsula agriculture due to yellow burrweed is additional herbicide use and a subsequent reduced pasture production (Carter 1985, unpublished report).

A regional co-ordinated control program for yellow burrweed includes publicity, extension, and close liaison with landholders to identify new infestations early. The control aim is to reduce the rate of spread to areas where yellow burrweed has potential to be a major cereal weed(2).

No yellow burrweed has been found on roadsides in the region, so other techniques for finding new infestation are used. A free plant identification service is provided to encourage the public to report new weeds.

Part of the extension program has been to encourage farmers who bring fodder onto their properties to feed it out in a feedlot. This is efficient and reduces the risk of introducing new weeds (Ashton, pers. comm.). During the three year period to April 1989 parts of Eyre Peninsula were suffering a drought. Large quantities of fodder were brought into the region.

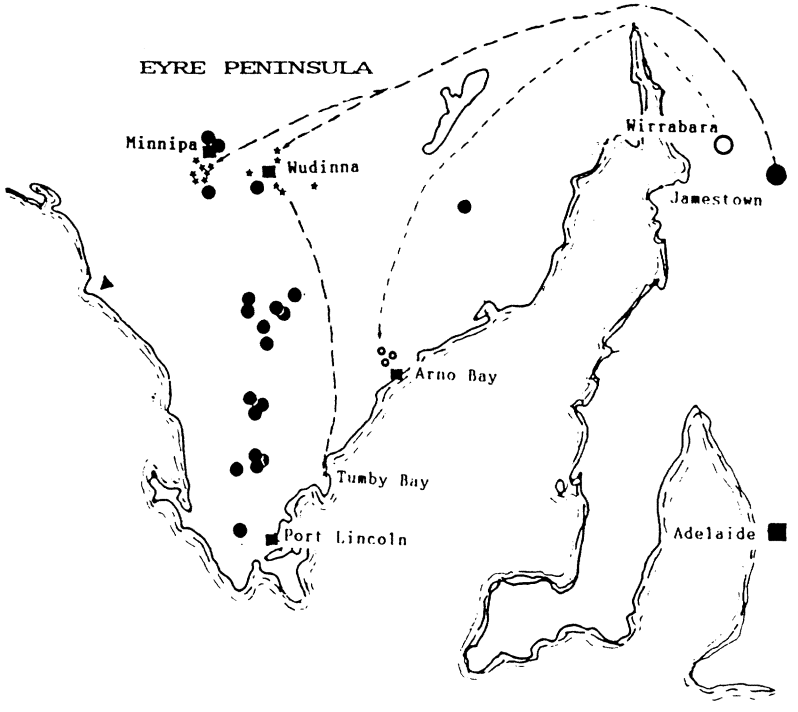

Figure 1. Yellow burrweed, *Amsinckia* spp. records for Eyre Peninsula, South Australia. New infestations following dispersal in drought fodder *A. lycopsoides* 1986 (o), *A. calycina* 1989 (*) and other records *A. lycopsoides* (○), *A. intermedia* (▲) and *A. calycina* (●).

INTRODUCTION OF WEEDS IN FODDER

Arno Bay sites. In the summer of 1985-86 lucerne hay from Wirrabara was transported to five sites in the Arno Bay area, some 300 km distant. In October 1986 a farmer reported yellow burrweed, *A. lycopsoides*, growing adjacent to a hayshed. This was the first record for the Eyre Peninsula (10). Subsequently it was found where the hay was fed out in adjacent paddocks. No plants were detected in the little remaining hay. *A. lycopsoides* was present in the paddock where the purchased fodder originated.

By investigating trade records we located four other properties where hay from the same source was delivered. *A. lycopsoides* was found on two of these sites.

Control. The early detection of the three outbreaks allowed for a thorough control program to be implemented.

In 1987 plants were found at the same sites as the previous year. In 1988 plants germinated at only two sites and in 1989 no plants were found.

Central Eyre Peninsula Sites. In September 1989 a transport operator found *A. calycina*, in his depot. Investigation of trade records identified the source as over 500 t of hay from Jamestown which was transported by the operator to 17 sites in Central Eyre Peninsula over 300 km away in March 1989. The investigation was able to be carried out by co-operation and liaison without using legislative powers.

On 14 of these sites *A. calycina* was growing where the fodder was stored and fed out. *A. calycina* was also found in hay at 2 of the 3 sites where stocks remained and it was confirmed that it was present on the source property.

The newly infested sites are clustered within 15 km of Wudinna and 10 km of Minnipa, with one site at Tumby Bay shown on fig. 1.

At four sites all hay was fed in feedlots, and infested areas at those sites are limited to the feedlot and hay storage areas totalling less than 1 ha. Where hay was paddock fed the infested area vary from 120 ha to 450 ha.

DISCUSSION & CONCLUSIONS

In the two areas considered, new infestations established in clusters. To a casual observer of fig. 1 the foci from which yellow burr weed dispersed would appear to be within the clusters. The infestations are clustered because of trade networks which brought contaminated fodder into the region. A cluster of new weed outbreaks does not mean that the source of seed is local.

Careful but speedy investigative work following an initial outbreak enabled us to alert others of a potential problem early enough for treatment prior to secondary spread. Some infestations may have been eradicated. From one nucleus, in this case a hay producing property, a weed can disperse and establish at many sites. It is from these satellite infestations that spread is most rapid(4,21). These should be controlled first as removal of just some satellite infestations will greatly reduce the spread rate(16).

Where contaminated hay was fed in feedlots, yellow burrweed was able to establish, but in a restricted area which may be easily treated and monitored. Eradication from these sites is a reasonable short-term objective. Weed control authorities should continue to promote feedlotting of fodder brought onto a farm, especially during drought.

Liaison between local control authorities and landholders was important to ensure new infestations were noted early. Investigative work and publicity assists identification of new infestations during the first season after introduction. By searching for and destroying plants before first seed is set in satellite infestations these do not become foci for subsequent spread. Where new infestations are small, confined to feedlots or hay stack areas there is more opportunity to ensure a high level of control. In large paddock infestations some plants may miss treatment and produce seed.

The potential for rapid dispersal and subsequent establishment of two species of Amsinckia in drought fodder is confirmed. Local containment programs on Eyre Peninsula will prevent new infestations becoming foci for spread, but more general programs are needed where fodder is transported long distances.

Fodder is important as a means of weed spread. It is desirable for both farmers and weed control authorities to avoid potential problems by minimising long distance fodder movement.

Drought fodder freight subsidies which increase the quantity and distance that fodder is carried would increase the risk of introducing new weeds. Subsidies which encourage keeping on-farm fodder reserves would reduce the risk.

It is unlikely that roadside inspection could identify the number of outbreaks as rapidly as the investigative approach.

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