Rubber vine eradication in the East Kimberley: collaboration to fight a common enemy.

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Abstract

Rubber vine (*Cryptostegia grandiflora*) has been a focus of an intensive and collaborative eradication campaign in the East Kimberley region since 2009. The campaign has substantially reduced the infestation from 2011 – 2021 by removing over 72,000 plants for a total average annual cost of AUD $214,000 per year. Due to an intensive aerial and on-ground surveillance and control, density of plants within the managed areas decreased from approximately 40 plants/ha in 2014 to 9 plants/ha in 2021. At the end of 2021, the majority (59%) of the management area was eradicated, 26.4% was under monitoring, and 14.6% was under active control. To continue suppressing the infestation, the program applies aerial surveys to detect flowering vines, and intensive on-ground surveys to detect and control vines in all growth stages. More recently, the program tested remote sensing to increase detection of both, flowering and non-flowering parts of rubber vine during aerial surveys.

Keywords: rubber vine, eradication, Kimberley region, savannah.

Introduction

Rubber vine is a declared pest in Western Australia. It poses a serious threat to pastoral production, agriculture, and biodiversity in the East Kimberley region and has been a focus of an intensive eradication campaign by the Department of Primary Industries and Regional Development (DPIRD), the Department of Biodiversity Conservation and Attractions (DBCA), and the Kimberley Rangelands Biosecurity Association (KRBA) since 2009. The infestation area is located at the southern end of Lake Argyle between Ord and Bow Rivers, and Limestone Creek (an area of approximate size 20,000 ha). Within this area, the infestation is controlled across 17 smaller areas (‘management area’) of an approximate total size of 530 ha.

Methods

Aerial surveys for rubber vine are being conducted annually across the broader infestation area (20,000 ha) at the end of the wet season and are typically aligned with the peak of rubber vine flowering to increase detection rate of vines from the air. The surveys are usually conducted by two experienced observers who fly a systematic transect pattern across the entire

infestation area, and linear (contour) search along creeks and streams with most favourable habitat for rubber vine (LARVAC 2022; Figure 1).

Aerial surveys are followed by targeted and intensive on-ground surveys within the management area, from May till October each year. The area is surveyed by a systematic transect pattern within pre-defined grids of 0.25 ha per grid. The grids are overlayed on top of each waypoint of detected rubber vine, or cluster of vines, forming a 50 x 50 m 'grid network' (Figure 1). Each grid is searched by up to four parallel transects (depending on the density of vegetation) to ensure a thorough and uniform search. Grids containing juvenile rubber vine plants are surveyed for a minimum of two years, and grids containing breeders are surveyed for a minimum of three consecutive years.

The age category of each detected vine is recorded as: seedling, juvenile, non-reproductive adult, flowering adult, and seeding adult. All detected plants are controlled by one, or a combination of few methods. Majority of plants are removed by cut stump and application of Vigilant® II (4.47 g/L aminopyralid, 44.7 g/L picloram; Corteva Agriscience) herbicide, and small seedlings are usually pulled manually. Dense infestations are controlled by foliar application of Grazon Extra (300 g/L triclopyr, 100 g/L picloram, 8 g/L aminopyralid; Corteva Agriscience) and Metsulfuron Methyl 600 WG (600g/kg metsulfuron-methyl; 4 Farmers Australia), which are later burned. Burned areas provide a better access to control the remainder of surviving plants by cut stump (LARVAC 2021).

Figure 1. Aerial view of the methods used when searching for rubber vine in the East Kimberley region: left pane – systematic transects (white lines) of an average 150 m swath flown across the broader infestation area during annual aerial survey, including contour searches along creek lines and point searches around suspected rubber vine detections; right pane – 0.25 ha grids (white squares) overlayed on top and around each rubber vine waypoint (yellow dots). Each grid is searched by up to four parallel transects during on-ground surveys.

Results and Discussion

The program has substantially reduced the infestation from 2011 – 2021 by removing over 72,000 plants for a total average annual cost of AUD 214,000$ per year. Due to an intensive aerial and on-ground surveillance and control, density of plants within the management area decreased from approximately 40 plants/ha in 2014 to 9 plants/ha in 2021. At the end of 2021, the majority (59%) of the management area was eradicated, 26.4% was under monitoring, and 14.6% was under active control (Figure 2).

The evident decline in the size of infested areas in the control phase and the increase in the size of monitoring and eradicated areas illustrate the overall progress made of the program towards eradication within the management area. Despite the annual discovery of new infestations, the gradually decreasing proportion of the management area in control phase since 2014 demonstrates that plants are effectively controlled when found (Zabek 2022; Figure 2).

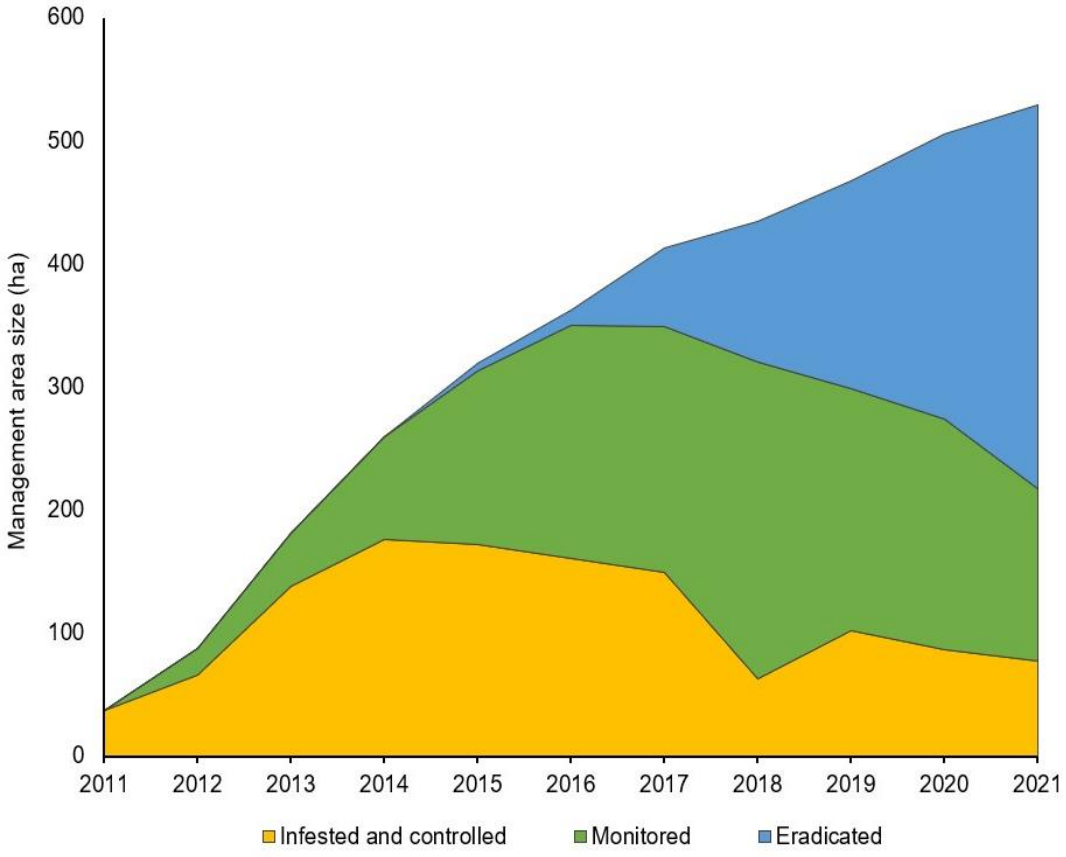

Figure 2. Cumulative size (530 ha) of the rubber vine management area in the East Kimberley from 2011 – 2021; orange – area infested and controlled; green – area monitored where no plants were detected within 1-3 years, and blue – area eradicated with no plants detected ≥3 years.

Conclusion

The inability to detect all flowering vines during aerial surveys poses a considerable challenge to the eradication program, which aligns many of its on-ground survey and control activities with the locations of detected flowering vines. To increase the effectiveness of this eradication campaign, the program must increase detection rate of non-flowering vines within the surveyed areas.

While aligning the timing of aerial surveys with the peak of rubber vine flowering is crucial, additional measures are being gradually implemented to increase detection rate of plants. The methods include: 1) increasing the area searched during aerial surveys around most suitable rubber vine habitats, 2) increasing the length of time of repeated on-ground searches of previously infested grids with breeding plants from three to five years to prevent recruitment, and more recently, 3) investigating remote sensing technique in detecting flowering and non-flowering rubber vine on high-resolution images to increase rubber vine detection rate during future aerial surveys.

To ensure effective communication, and continuous planning and review of the program, the main program partners (DPIRD, DBCA, and KRBA who are the members of the Western Australian Rubber Vine Advisory Committee; WARVAC) consistently and carefully document all program's data and apply analytical rigour in the interpretation of results. WARVAC is involved in the scoping, planning, budgeting, and all aspects of operational work.

Conflicts of Interest

The authors are members of the Western Australian Rubber Vine Advisory Committee and declare no conflict of interest.

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