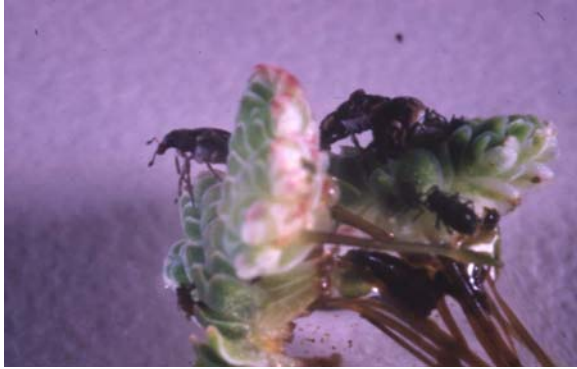


THE FROND FEEDING WEEVIL (*STENOPELMUS RUFINASUS*): A NATURAL ENEMY OF RED WATER FERN (*AZOLLA FILICULOIDES*) IN SOUTH AFRICA

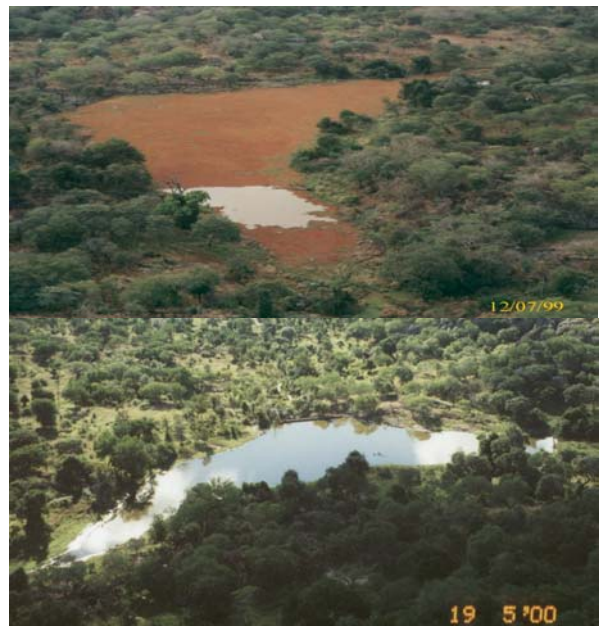
Description: Adult weevils are small ($\pm 1.7\text{mm}$ long) and are a gray-black colour with red, black and white scales in a variable pattern.



Life cycle: Adults are fairly long-lived (55-60 days) with each female producing on average, 324 viable offspring. Eggs (yellow-orange colour) are deposited singly into holes chewed into the tip of the fronds. Incubation lasts about 5 days and the duration of the immature stages is roughly 7 days. Pupation occurs in a black, ovoid chambers which the mature larva constructs by chewing a depression on the leaf surface and then covering itself with an anal secretion. Adults emerge 5 days later. The total duration of the life cycle (egg to adult) is approximately 20 days.



Feeding damage: Larvae feed voraciously on the fronds of red water fern. Older larvae are capable of consuming several plants per day. Damage to a mat of red water fern can be seen as a change in fern colour to a purple-red colour. Plants also become flat and reduced.



Impact on red water fern: As the population of weevils increases on a mat of the weed, damage becomes evident. The mat then begins to fragment with eventually most material sinking due to wave action. Sites are usually cleared in less than one year.

**GUIDELINES FOR THE MASS-REARING AND RELEASE OF THE FROND FEEDING
WEEVIL (*STENOPELMUS RUFINASUS*), ON RED WATER FERN (*AZOLLA
FILICULOIDES*) IN SOUTH AFRICA**

Equipment

You'll need to obtain:

- Six plastic containers, each with a capacity of approximately 50 liters.
- Six pieces of fine curtain netting, each big enough to cover one of the six containers.
- Five kilograms of Azolla material
- A 10 kg bag of super phosphate fertilizer.
- A spray bottle
- A fine-haired artist's paintbrush.

Setting up the rearing containers

Position your containers in a sheltered, sunny locality (three in a row with the two rows having a gap of at least two meters). Fill each of the containers to three quarters of their capacity. Place a handful of the super phosphate fertilizer in each of the containers and allow to stand over night. Inoculate each of the containers with approximately one kilogram of material (i.e. enough to cover the surface of the water). Release between 10 and 20 adult weevils onto the weed in each of the three of the containers (in one row). Finally cover all the containers with the curtain netting and secure in place with string or elastic. (This will allow you to grow 'food' for the cultures in three of the containers while the weevils are restricted to the other three containers.)

Culture maintenance

Check on your cultures every second day to monitor how quickly the material is being used up. Damaged material is purple-brown in colour and eggs and larvae should be visible (small, orange-red and worm-like measuring between 1 and 4 mm). Insert fresh material into cultures by clearing a small patch of open water with one hand and then placing a handful of Azolla into the water with the other. The material should be poked with the fingers to ensure that the plant roots are hanging in the water. Every other day the cultures should be sprayed with water in the spray bottle.

Collecting weevils

Weevils should only be collected during the summer. Only 50 adult weevils per week should be removed from each container. Collect weevils during the hottest part of the day, as this is when they are most active. Wet the bristles of the fine-haired artist's paintbrush with water and then use it to gently scoop up adult weevils. Place in a container with fresh Azolla material (there should be no water in this container).

Potential problems

Fungus may attack both the weed and the weevils. In the case of the weed being attacked, regular spraying with the spray bottle should eliminate any fungal outbreaks. Older weevils are usually plagued by fungus. The weevil becomes covered with white fluffy threads. If an infected individual is spotted, simply remove it from the culture so as to prevent any further spread to healthy weevils.

Ants may invade the cultures, carrying off both larvae and adults. There are two practical solutions to this problem. The first is to smear the rim of the container with Vaseline or talcum powder (the ants should be hesitant to cross either of these). The second solution is simply to stand the containers in trays of water.

Releasing weevils

Identify a sheltered locality at the release site (i.e. away from running water and wind etc.). Reeds and channels are often suitable areas. Gently knock the weevils out of the container onto a healthy aggregation of Azolla. (Make sure that the weevils don't end up in the water!) Remove and place the Azolla that was in the container into the water, as the weevils may have already laid eggs on it. Do not try and spread the weevils throughout the site. By releasing them all in one place, the probability of them finding each other is increased.

Releases of biological control agents

Agent released:

Target Weed:

Released by:

1. Details of person responsible for release

Name	
Address	
Telephone Number:	Fax Number:
Organisation	E-mail Address:

2. Location of release site

Province	
Nearest Town	¼°Square Number
Latitude (°S)	Longitude (°E)
District/Farm Name	
WFW reference (Nbal, Treatment Number or WfW project name & number)	
Actual Position	

3. Habitat of site (tick appropriate boxes)

Natural vegetation types		Disturbance/land use		Landform/moisture regime		Aspect	
Forest		Road/rail side		Watercourse		Direction- N	
Savanna		Around habitation		Wetland		S	
Grassland		Plantation		Dryland/well drained		E	
Karoo		Arable/Ploughed		Kloof/ravine		W	
Fynbos		Pastoral		Rocky site		Steep	
Transformed		Wasteland		Deep sand		Gentle incline	

4. Host plant (weed) abundance (circle one appropriate code e.g. P)

P = Present (abundance uncertain)	R = Rare (one sighting of one or a few plants)
O = Occasional (sightings of one or a few plants)	F = Frequent (many sightings of single or small groups of plants)
A = Abundant (many sightings of clumps or stands)	V = Very abundant (forming extensive stands)

5. Details of release

Reason for release		Time of day	
Number of insects*			
No. Infested plants released*		Temperature	
No. Infested leaves released*		% Cloud cover	
Stage of insect released*	E L/N P A	Was it raining?	
Condition of insects		Was it full sun?	

* This depends on type of insect and appropriate release technique, therefore as applicable

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Monitoring/Observation of biological control agents

Biocontrol Agent:

Target Weed:

1. Details of person conducting monitoring

Name	
Address	
Telephone Number:	Fax Number:
Organisation	E-mail Address:

2. Location of site

If a previously registered release site, release record number.	
Province	
District/Farm Name	
Nearest Town	¼°Square Number
Latitude (°S)	Longitude (°E)
Actual Position	

3. Habitat of site (tick appropriate boxes)

Natural vegetation types	Disturbance/land use	Landform/moisture regime	Aspect
Forest	Road/rail side	Watercourse	Direction- N
Savanna	Around habitation	Wetland	S
Grassland	Plantation	Dryland/well drained	E
Karoo	Arable/Ploughed	Kloof/ravine	W
Fynbos	Pastoral	Rocky site	Steep
Transformed	Wasteland	Deep sand	Gentle incline

4. Host plant (weed) abundance (circle one appropriate code e.g. (F))

P = Present (abundance uncertain)	R = Rare (one sighting of one or a few plants)
O = Occasional (a few sightings of one or a few plants)	F = Frequent (many sightings of single plants of small groups)
A = Abundant (many sightings of clumps or stands)	V = Very abundant (forming extensive stands)

5. Insect Presence (circle one code in each line e.g. (Y))

Signs of insect feeding:	Y = Yes	N = No		
Life stages seen:	E = Egg	N = Nymphs	L = Larvae	A = Adults
Are they being attacked: (e.g. by ants):	N = No	Som = Some predation	Sev = Severe predation	
Insect Abundance	P = Present (abundance uncertain)	Abu = Abundant (large numbers immediately apparent)	Com = Common (easily located in large numbers)	Sca = Scarce (sparse, difficult to find)

6. Damage to weed (circle one appropriate code e.g. **Tr**)

Tr = Trivial (infrequent signs of damage)	Mod = Moderate (Frequent signs of damage, plants unstressed)
Con = Considerable (signs of stress or some deformation)	Ext = Extensive (host obviously stressed or extensively deformed)
Tot = Total (host plants dead, total collapse of weed population)	

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