THE SEED FEEDER (*SULCOBRUCHUS SUBSUTURALIS)*: A NATURAL ENEMY OF MAURITIUS THORN (*CAESLAPINIA DECAPETALA)* IN SOUTH AFRICA

Description: The adult is a small (± 4mm long), black seed-weevil with fine, grey hairs. They are dirunally active and fly readily.

Life cycle: Adults live up to 65 days and deposit between 73 and 111 eggs. The eggs are deposited singly into the seed coats. Incubation period is about 8 days and the development of the immature stages is about 35 days. The larvae do not transfer between seeds. Pupation occurs within the seeds. Usually five or six beetles can develop in a single seed.

Feeding damage: The presence of the larvae in a seed is characterised by white flecks on the seed coat. The larvae burrow into the seed, destroying it and preventing germination. The adults produce a distinctive round emergence hole.

Impact on Mauritius thorn: The beetles attack the mature seeds that have already dehisced from the pods. The beetle will decrease the number of mature pods available for regeneration of Mauritius thorn. However, they will not impact existing trees.

GUIDELINES FOR THE MASS-REARING AND RELEASE OF THE SEED-FEEDER (*SULCOBRUCHUS SUBSUTURALIS*),ON MAURITIUS THORN IN SOUTH AFRICA.

Use four well ventilated containers. Place a single layer of Mauritius thorn seeds (that dried out naturally before they were collected from the pods in the field) on the container floors. Put two or three pieces of wet cotton wool, onto which one or two drops of honey have been smeared, at regular intervals across the container floor. Alternatively, glass or plastic vials filled with water, which have cotton wool wicks protruding through holes in their lids, may be used. Tn this case a few drops of honey are dissolved in the water. Vial feeders need to be filled less frequently than bare bits of cottonwool need to be rewetted. Put adult beetles into the containers at a rate of 1 beetle per seed.

Place the containers in a light (not hot) place where the air is not too humid. The temperature should vary between about 24^{o}C and 28^{o}C. Because the cottonwool bits or the feeder wicks are always wet, foraging ants will lay trails to them (if the ventilation gauze allows them through if it doesn't there shouldn't be a problem with ants). Ants readily attack beetles and attempt to pull them through large-mesh gauze. This is easily prevented by placing containers on cups (or similar objects) that stand in dishes of water.

Within four days the first eggs should have been laid. If eggs are not noticed within a week it means the air is too humid or the seeds are wet. Oviposition is promoted in very dry conditions, in contrast to larval development, which requires humid air. Place the whole container in the fridge for three minutes to slow the beetles down so that the lid can be removed without them escaping. Look for 1mm long, slightly opaque, oval- shaped eggs. These will take about a week to hatch, at which time they turn white due to shavings of the seed coat being pushed into the eggshell as the larva bores down through the seed coat. Allow as many as about 10 eggs to be laid on a single seed. This should take about 10 days, depending on the temperature.

The developing larvae will take about 3 weeks to a month to develop to adulthood at 24^{o}C to 28^{o}C. Relatively high humidity is needed at this time, particularly towards the end of the larval stage, and particularly if it is winter, when the air is dry. Pupae and unemerged beetles will die in the seeds if the air is too dry. When 'windows' in the seed coats of about 2mm in diameter are noticed, beetle emergence is imminent. Collect newly emerged adults every day and keep them in a container without seeds, but with honey water. Keep beetles that emerged from seeds in one container separate from those that emerged from seeds in another. When beetles stop emerging, divide each container's beetles into 4 groups. Repopulate each new egg-laying container with a quarter of the beetles of each emergence container. This is to prevent in-breeding. Repeat the process from the top. This will keep a *Sulcobruchus* culture going for as long as there are seeds.

In winter culture size may be decreased to a total (in all four containers) of 200 seeds and 100 beetles. Increase the number of seeds and beetles in October /November according to how many releases need to be made. Release about 1000 beetles at a site. Make three releases per site per season. The last release must be in April or May.

What to look for

If the males are vibrating their wings vigorously and often in the presence of females it means you're doing the right thing – this is how they signal their intention to mate. If they are still not 'dancing' after a few days you should increase the temperature or replenish their food.

In the eight or so days preceding hatching the egg is translucent but nevertheless easily visible in

good light. The eggs are more visible when they have hatched, being white from the shavings of the seed coat being pushed into the egg shell as the larva moves down into the seed. These shavings are pushed through a tiny hole chewed in the egg shell by the larva before it starts burrowing downwards, causing a seed that has a few hatched eggs on it to become covered in white powder.

It will appear as if nothing is happening in the two to three weeks after hatching, but the larva is growing everyday. If you're concerned that the larvae may be dying, crack open a few seeds and check that the larvae inside have 'body juices', or, if you happened to crack the seed without killing the larva, that it moves when you prod it. In the third week after hatching you should start noticing circular areas of the seed, about two to three millimetres in diameter, that are paler than the rest of the seed. This means there are mature beetles in that seed (one for each 'window') that have started to scrape away the remaining seed coat, and that will soon begin to 'cut' the outer layer of the coat, along the circumference of the window, in order to be able to lift this window out of the way for emergence. Up to nine beetles may develop successfully in a large seed, so the seeds should not be discarded until beetle emergence has ceased (no beetles have emerged for two weeks).

Mite infestations

Two factors promote infestation by mites:

1) Unemerged beetles in seeds from which beetles have already emerged, whose exoskeletons are not fully sclerotized, are vulnerable because it is easier for mites to enter the seeds through the emergence holes of other beetles than through the small holes of neonate larvae, and because they are unable to move away from the mites.
2) Mites thrive in high temperatures and humidities.

When mites have reached sufficient numbers they will even be able to enter seeds in which there are no emergence holes, using the tiny neonate holes instead. In other words your entire culture may easily be wiped out in a few days if you fail to prevent mites or if you don't act quickly when you first spot mites.

To know whether you have mites or not, record when your eggs were laid. If beetles don't start emerging when they should you should crack open 10 seeds and look for mites, tiny (you'll need a hand lens or a microscope) brown creatures that run swiftly and continuously. The female mites are light brown, immobile blobs about the fifth of the size of a beetle. The best way to prevent mites is to let emergence happen in a cool room (which shouldn't have dry air). The low temperature will make it difficult for mites to survive. Remove all adult beetles as soon as they emerge and place them in a clean feeding container in a cool, dry room far away from where the culture seeds are a new culture.

If you have a mite infestation the best thing to do is to divide the seeds up into 20 groups. Put each group of seeds into its own closed container, and place all the containers in the fridge. Check the containers each day for newly emerged beetles. Collect these and start again.

Release Record Number……..……(Official use only)

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/railside		Watercourse		Direction- N	
Savanna		Around habitation		Wetland		S	
Grassland		Plantation		Dryland/well drained		E	
Karoo		Arable/Ploughed		Kloof/ravine		W	
Fynbos		Pasoral		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 Record Number……..……(Official use only)

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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