African black beetle (Heteronychus arator) - pest of viticulture

Common names
- African black beetle
- Black lawn beetle

Origin
- Southern Africa

Pest of non-legume crops and plants
- Pastures/lawns - kikuyu, couch, and tufted perennial grasses (e.g. perennial rye)
- Horticultural crops - young vines (newly planted cuttings and young rooted vines) and potato crops.
- Ornamental - young trees (e.g. blue gum) & young/thin wooded plants (e.g. proteas).

Pest of grapevines in…
- Western Australia (regular) – south west
- South Australia (occasional) – McLaren Vale and Adelaide Hills
- Victoria (occasional)

Description
- Larvae - are soil dwelling and are typical white 'curl grubs', they have three pairs of legs on the thorax, a prominent brown head with black jaws and are up to 25 mm long. The abdomen is swollen; baggy and grey/blue-green, due to the food and soil they have eaten.
- Adults - are usually found on or under the soil surface, to a depth of about 150 mm. They are a shiny black and cylindrical cockchafer that is slow moving and is approximately 15mm long. The adult is capable of flying.

Life cycle
- Spring - adults become more active, they feed on stems of plants at or just below ground level and lay eggs. These adults die by the end of early summer.
- Eggs hatch into grubs late spring / summer, so adults and young larva are found together.
- Larva feed on organic matter and roots till late summer and then change into pupae.
- New adults emerge from mid summer to early autumn.
- Adults feed whenever present, but more so in summer as young adults after emergence.
- Adults may undertake mass flights on warm sultry nights in late summer / autumn. Flight activity also occurs in spring, but numbers of beetles involved is much less. The adults are attracted to light.
- These insects spend the winter as non-reproductive adults and can cause damage during winter.

'Looks like'- similar insects
- adults can be confused with dung beetles (*Onitis alexis, Onthophagus binodis, Onthophagus ferox*) - looking from above, the 2 body segments of dung beetles are almost

equal in length and have the appearance of being well rounded; the head segment of African black beetle is shorter than that of the wing covers.
- adults of other cockchafers – these are not shiny black and often have prominent ridges along the length of the wing covers.
- larvae can be confused with lesser pasture cockchafer (*Australaphodius frenchi*) - larvae of the pasture beetle are never larger than first instar African black beetle; adult pasture beetles are much shorter - only up to 3-4mm long.

Damage and loss
- Damage by African black beetle occurs during spring to early summer when the adults are most active crawling on the soil surface, and again after new adults emerge in mid summer - autumn. They eat the cuttings and rootlings at or just below ground level, ringbarking the vine, causing wilting and collapse. The problem is greatest where vines have been planted onto old pasture land, especially if kikuyu is present. Beetles may infest a site in autumn when they actively fly.
- Vines are only susceptible to damage by African black beetle for about two seasons from planting out, as the vines become too woody to be damaged by the beetle after this time.

Monitoring
- Adult flight activity - Light trap catches or observing activity around lights near buildings during summer / autumn prior to planting on old pasture or potato land.
- Soil sampling - Counting the number of adults from shovels full of soil - 6 beetles/sq. m would represent a potentially damaging population.
- Adult walking catches - Because the beetles are clumsy walkers, they can be collected by pitfall traps or sharp sided plough lines.
- Sentinel drenching – Spot treatment with chlorpyrifos may be used to gauge insect abundance.

Management options
- Cultural

  - old pastures should be cultivated and fallowed or planted with a less favourable plant (e.g. legume) the season prior to planting vines to help reduce beetle numbers. The area should be kept fallow, if possible, immediately prior to planting vines especially during summer when larval stages are present.
  - because the susceptibility of vines lessens as they grow, healthy vines will require monitoring for a shorter period than situations where vines are under some stress and are growing slowly.
  - use of organic mulches along vine rows may favour a build up of adult beetles at the base of vines and increase damage.
  - mounding the soil above the damaged section of the butt may prevent vine death (this technique has proved beneficial in one vineyard but long term vine survival is not known at this stage). Such mounds would still require additional management techniques such as insecticide treatments.

- Physical

  - plastic guards around individual vines if not buried can exacerbate beetle numbers. If these are buried they may exclude beetles and prevent ring-barking, but the presence of weevils and opportunity for an increase in fungal diseases need to be considered.

  plastic mulch over raised vine rows at planting may limit the ability of beetles to crawl to the base of vines.

- plastic mesh sleeves have been used successfully by tree plantations (e.g. blue gums) to exclude African black beetle adults from feeding at the base of the vines. These mesh sleeves are applied at planting in the tree industry. The application of the mesh sleeves in commercial vineyards are currently under investigation.

- Biological

  - birds such as guinea fowl and chickens are beneficial in controlling a range of other pests such as garden weevil, wingless grasshopper and snails. These birds have been recorded feeding on adult African black beetles but they have not been shown to control a pest population in vineyards.
  - a nematode (H*eterorhabditis zealandica*) native to NSW is used to control African black beetle in turf. For biological and economic reasons, they are unlikely to be applicable in vineyards.

- Chemical

  - a trial permit (Trial Permit No. PER 4621) using chlorpyrifos by base drenching or by insectigation through dripper irrigation systems has been approved by the National Registration Authority. Contact Western Australian Department of Agriculture or chemical re-seller for details of this Permit and the latest information on insecticide use.
  - chlorpyrifos as a slow release granule (in a plastic polymer matrix) is registered as a soil insecticide in the nursery industry. This Cropcare product has been investigated for control of African black beetle in grapevines and the company is currently pursuing registration for this use.

References

Fisher, D. and Learmonth, S. (2001) *African black beetle in vineyards*, Bulletin No. 4500 Agdex 241/622. Department of Agriculture, Perth.

Learmonth, S. (1988) *Identifying soil insect pests – beetles*, Farmnote No. 75/88, Agdex 611, Agriculture Western Australia, Perth.

Matthiessen, J. and Learmonth, S. (1991) *African Black Beetle*, Farmnote No. 17/91, Agdex 622, Agriculture Western Australia, Perth.

Nicholas, P., Magarey, P. and Watchel, M. (eds) (1994) *Diseases and Pests – Grape Production Series Number 1*, Winetitles, Adelaide.

This information has been written for Western Australian vineyards and some modifications may be required for other states.

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Figure 1: African black beetle larva. The large larva is final instar of African black beetle. The small larva are last instar of lesser pasture cockchafer and are the same size as a first instar African black beetle larva.

Figure 2: African black beetle pupae.

Figure 3: African black beetle adult.

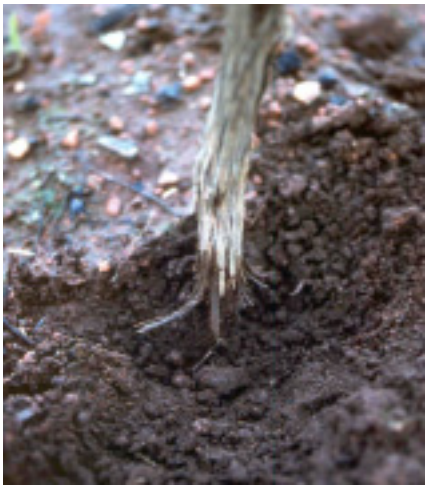

Figure 6: Close up of vine ringbarked by African black beetle adult. Note the characteristic splayed bark.

Figure 7: Base drenching with chlorpyrifos for African black beetle control.

Figure 4: Discoloured vine foliage on a red grape variety as a result of ringbarking by African black beetle adults.

Figure 5: Discoloured vine foliage on red vines in the vineyard as a result of ringbarking by African black beetle adults.

Figure 8: Discoloured vine foliage on a white grape variety as a result of ringbarking by African black beetle adults.

Figure 9: Dead African black beetle adults as a result of (sentinel) base drenching.

Figure 10: An example of a pitfall trap.

Figure 11: Under trial – granular chlorpyrifos.

Figure 12: Under trial - black plastic.

Figure 13: Under trial – plastic mesh sleeve.