

Terellia virens (Loew)

INVASIVE SPECIES ATTACKED: Spotted knapweed (*Centaurea biebersteinii* auct.)
Diffuse knapweed (*C. diffusa* Lam.)

TYPE OF AGENT: Seed feeding fly

COLLECTABILITY: Not available for general distribution

ORIGIN: Switzerland and Austria

DESCRIPTION AND LIFE CYCLE

Adult:

Terellia virens adults are about 5 mm long with yellow or greenish bodies. They have clear wings and large bright green eyes. They emerge in late May, usually about four weeks before the spotted knapweed plants begin to bloom. Mating and oviposition begin with the arrival of warm temperatures. Adults mate and oviposit for their entire 48 day lifespan. Females lay up to 80 eggs each, which are individually deposited into flowerheads. The females then leave a scent by dragging their ovipositor over the site and on the upper stem leaves to discourage other females from using the same head. Depending on climate and weather, one or two generations will be produced. If there are two generations, both will lay eggs within the same season.

Egg:

The elongated, shiny white, 1.0 mm eggs incubate for 3-5 days.

Larva:

The new white larvae gradually change to yellow-brown over 14 days and develop into a plump barrel-shape. The first two instars feed within a single ripening seed. As they mature, they move onto other seeds and, in some instances, the tissue below the seeds. In most cases there will only be one generation. In instances where there is only one generation, the larvae prepare to overwinter inside the cocoon which is partially inserted into the receptacle.

Pupa:

If the climate allows for two generations, the first generation will pupate just above the receptacle in an upright cocoon made of loosely woven plant fibres. Both generations have yellow-brown pupae.

Overwintering stage:

Larvae overwinter from either first or second generation adults. Pupation occurs the following spring.



Fig. 1. *T. virens* adult (credit Powell et al. 1994)



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EFFECTIVENESS ON HOST PLANT

Larvae feeding in flowerheads cause considerable damage to seeds. It completely consumes some seeds and partially feeds on others. It has been measured to cut viable seed production by 90%.

HABITAT AND DISTRIBUTION

Native:

Native to Europe, *T. virens* occurs on dry sites within the grape growing areas of western, central and south-eastern Europe. It is found in southern Austria, east and central portions of the former Czechoslovakia, southern France, Alsace, southern Germany, western and central Hungary, Israel, Turkey, Italy, Jordan, Morocco, eastern Romania and south Switzerland.

North America:

South facing dry slopes within the dry end of the spotted knapweed range are suitable for *T. virens*. The flies were released onto spotted knapweed in the U.S.A. and have now established in Calif., Colo., Mont., Oreg., Wash. and Wyo. Canadian releases were also released onto spotted knapweed in B.C. and Alta., but only short term establishment

occurred. In the United States it appears to be more successful when it occurs at sites with no *Larinus* species present. In the Calif., *T. virens* was released onto purple starthistle and squarrose knapweed but according to the most recent information available, the flies failed to establish on these species.

British Columbia:

Predicted preferred B.C. habitat will be similar to that found in the Okanagan Valley, Kamloops, Castlegar and Grand Forks. Releases have been made into the Bunchgrass, Interior cedar-hemlock, Interior Douglas-fir and Ponderosa pine biogeoclimatic zones. Short-term establishment was confirmed in the Bunchgrass and Interior cedar hemlock zones.

BRITISH COLUMBIA RECORD

Origin:

The *T. virens* populations released in B.C. originate from Swiss Valais and Austria.

History:

T. virens was first introduced into rearing plots in 1991 and again in 1995. Seven field releases occurred in 1992 near Kamloops, Walachin, Savon and Chase and in 1995 another four releases were made near Nelson, Castlegar and along the Pend d'Oreille River. Several of the field releases were mixed populations with *Chaetorellia acrolophi*. At this time, long term establishment has not occurred.

Propagation results:

The two releases made in the rearing plots continued to produce a small population at the Kamloops Propagation Facility for several years, but, insufficient numbers developed to allow for collection. *T. virens* was reared and propagated in a competitive environment with *Urophora spp.* for several years. The *T. virens* population declined over time, while the *Urophora spp.* persisted. In 2000, the *T. virens* rearing plots were excavated and dismantled.

Field results:

In 1993, *T. virens* was confirmed established at one site near Kamloops. Subsequent releases in the Kootenays have shown limited establishment in the past, though recent observations at these sites have not indicated long term success. Monitoring has shown that low populations may exist in two areas of the southern interior, however, in 2008 and 2009, all field release sites were revisited, but no further evidence of establishment was found. Release site monitoring and dispersal monitoring is ongoing at regular intervals.



Fig. 4. *Terellia virens* general release area at Walhachin (Bunchgrass zone)

NOTES

- *T. virens* may be a possible biocontrol agent for black knapweed.
- *T. virens* is a weak competitor against *L. minutus*. It can inhabit sites with *Chaetorellia acrolophi* and *Urophora spp.* However, high densities of *U. affinis* may interfere with *T. virens* populations.

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