

**Improving the Sustainability of Vegetable Production Systems  
by Using Nature as a Model for Agroecosystems  
Cover crops in cauliflower production:  
Implications for weeds, insects, beneficial arthropods and yield  
Wendy Hall (Canada), 2003**

Cover cropping systems may help to improve agroecosystems, through decreased soil erosion, improved soil fertility, promotion of beneficial insects and reduced weed competition. If these benefits are realized they can improve the sustainability of the system, as cycling, diversity, stability and capacity are enhanced. These changes bring the system to more closely resemble natural systems.

Within three experimental years, hairy vetch (*Vicia villosa* Roth.), fall rye (*Secale cereale* L.), yellow sweet clover (*Melilotus officinalis* L.) and white clover (*Trifolium repens* L.) were grown as cover crops with cauliflower (*Brassica oleracea* L. var. *botrytis*), and compared to monoculture cauliflower. In an effort to reduce competition between the cauliflower and cover crops, the cover crops were either mowed or rototilled prior to transplanting the cauliflower. The effects of the cover crops on weeds, allelopathy, cabbage and turnip root flies (*Delia radicum* L. and *D. floralis* Fall.), beneficial arthropods and cauliflower yield were investigated.

Monoculture and rototilled hairy vetch plots showed the highest number of weeds throughout the experiment. Mowed plots showed the lowest weed densities. None of the experimental treatments tested (rototilled hairy vetch, yellow sweet clover and white clover and mowed white clover) showed significant allelopathic potential. In 2000, the number of cabbage and turnip root fly eggs was not significantly different between the treatments. In 2001 however, fewer eggs were collected in cover crop plots, compared to the monoculture plots. In 2002, hairy vetch plots showed the largest number of eggs, but also had the largest abundance of beneficial insects, including spiders, carabids and staphylinids. Within week 28 and 29 of 2002, cabbage and turnip root fly egg registration was greatest. As well, carabid and staphylinid populations were largest during these two weeks, indicating that the populations were possibly influenced by the eggs. The resultant yields in the plots showed that rototilling of the cover crop prior to planting improved cauliflower yield, compared to mowing. The rototilled plots generally had the most weeds, but presumably the increased nutrient availability and reduced competition from the cover crops resulted in improved cauliflower yields, compared to mowed plots. Mowing of the cover crop decreased weed numbers, but most likely the higher level of competition and lower nutrient availability resulted in smaller cauliflower yields. Cover cropping systems have the potential to improve the sustainability of vegetable cropping systems, but more knowledge is required to establish and maintain ecological benefits, while still producing yields acceptable to farmers.