BEST MANAGEMENT PRACTICES FOR APHID TRANSMITTED VIRUS COMPLEX IN SNAP BEAN

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Introduction

During the 2000 and 2001 growing season, the development and presence of virus symptoms in snap bean crops increased dramatically. The symptoms were primarily caused by cucumber mosaic virus and alfalfa mosaic virus. The viruses had large economic impacts by reducing yields 90% or more and causing off colored, deformed and generally poor quality beans. These viruses have been present in various weeds and crops within WI for a number of years, but were seldom seen within snap bean and never to the extent seen in 2000 or 2001. Invasion by the soybean aphid and its mid summer migration into snap bean vectored viruses at high levels and subsequently led to the unprecedented yield and quality losses.

A number of techniques are being employed to manage and prevent the development of virus within snap bean. These practices are being primarily targeted at the vector (soybean aphid) or resistance to the virus within snap bean varieties. Management techniques being utilized include: 1) plant earlier in the season to avoid the virus by harvesting before soybean aphid migration, 2) use aggressive management programs (including insecticide seed treatment and foliar application or stylet oils) to manage soybean aphids in snap bean and prevent within field migration, 3) development of tolerant or resistant snap bean varieties.

The goal of this research was to investigate the cumulative effect of incorporating these strategies into an integrated management system. Specifically, this research attempted to determine the critical planting date when snap bean was vulnerable to virus infection and yield or quality response. In addition, this research attempted to determine how different aphid management strategies or varietal tolerance impacted the critical planting date.

Results and Discussion

Unfortunately, the development of high aphid populations did not materialize in the 2002 growing season. As a result, the virus pressure was dramatically reduced leading to little if any virus pressure within this experiment. This trend was observed in commercial production fields as well and Wisconsin's 2002 snap bean crop was excellent compared to 2000 and 2001. Only late planted snap beans within small regions of the state were impacted by virus in 2002.

There was no impact of insecticide treatment, variety, or stylet oil on yield or quality of snap bean. The response was due to the lack of severe aphid pressure or virus, not because these practices may or may not work (Table 1). Yield between tolerant and resistant varieties was significant at each planting date. The tolerant variety only yielded 40 to 50% of the susceptible variety across planting dates. Future work needs to determine the critical date at which infection may occur. Until tolerant or resistant lines are available that yield similar to susceptible standards, growers will only want to plant tolerant lines when the threat of virus infection is significant enough to justify the lost yield.

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Table 1. Yield of snap bean of a susceptible and tolerant variety across three planting dates. Yield is presented in Ton/A for the prime size class as well as total.

	Hystyle (susceptible)		MV185 (tolerant)	
Planting date	4-5	Total	4-5	Total
5/22/02	4.6	5.1	0.5	2.8
6/19/02	5.6	6.3	0.5	3.1
7/15/02	5.3	6.1	0.3	3.7

Little virus pressure existed within these plots as no symptoms were present except in the last planting date. ELISA confirmed no virus was present in the plants except at the last planting date. No deformities were detected on the beans either. Due to the low pressure it is not possible to determine the effect of different management strategies on disease development, yield loss, or quality impacts.

Future work is necessary to help determine what conditions are favorable for large-scale migration of soybean aphid and transmission of virus into snap bean. In additional, the critical planting date needs to be determined so that growers and processors can begin implementing management strategies when the threat for virus is real. Even though there was minimal effect in this trial, planting prior to the critical date was an effective means of preventing virus infection.