Harvest Season Effects on Asparagus Yield

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Introduction

In 1990 symptoms of asparagus decline were evident in several fields of asparagus (*Asparagus officinalis* L.) in Yuma and La Paz counties in western Arizona. Over 1,000 acres have been taken out of production or scheduled for reduced harvest duration in 1991. In these fields asparagus plant populations, yields and plant vigor had all decreased; Fusarium spp. were present on roots and crowns. In addition, crowns were close to the surface (less than 4" deep), there was evidence of mechanical damage to storage roots and a prior-year infestation of European asparagus aphid (*Brachycorynella asparagi* Mordvilko) had not been controlled. Although any one, or any combination, of the above stress factors could have enhanced the opportunity for Fusarium to become a pathological factor, another stress factor, excessive harvest pressure, was thought to have made a significant contribution to the reduction of plant vigor.

A large portion of this acreage in decline had been subjected to spring and fall harvests in the same calendar year. Takatori, et al, (1970) presented evidence that two harvests of 30 days each in the spring and the fall resulted in reduced plant vigor; yields levelled off after the first year rather than increasing progressively with each harvest season. The data also suggests that a late fall harvest might be feasible if managed to minimize subsequent sugar loss to fern growth. Reported grower practices deviated from this regime in that harvest was of longer duration in the spring and there was moderate fern growth after harvest in the fall; yields were down in the following spring indicating reduced vigor and possible reserve carbohydrate depletion. Concentration of asparagus storage root carbohydrate (SRC) did not differ significantly between gradually increasing light, moderate or heavy spring harvest regimes over a four year period (McGrady and Tilt, 1990b). This study was initiated to evaluate the effects of fall, spring or fall and spring harvest(s) on yield, vigor and SRC levels of a five-year-old asparagus planting.

Materials and Methods

Harvest season treatments were superimposed on an experimental field which had been subjected to progressive light, moderate or heavy spring harvests the previous four years (McGrady and Tilt, 1990a).The latter (harvest duration) plots were arranged in a randomized complete block with four replications at the Yuma Mesa Agricultural Center. Each treatment block had consisted of six 50-foot beds on 40" centers; each of the three harvest season treatments was randomly assigned to two of the six beds creating a 3x3 factorial experimental design with four replications.

Harvest season treatments wee initiated in fall 1990. Fern was cut with a sickle-bar mower and removed from the plots. Only one of the two beds was harvested for data; the other was harvested but served as a guard bed. Fall and fall & spring plots were harvested daily for 28 days beginning October 18, 1990. Fern in the remaining plots (for the spring harvest) was sprayed as needed with Malathion to control aphids.

Cool wet weather in late December delayed burning off the fern to prepare for the spring harvest until January 8, 1991, followed by a heavy irrigation to break dormancy. First harvest was February 13 and is in progress.

Results

Preliminary yield data of marketable spears and culls is presented in Table 1. Yield for fall and the fall segment of the fall & spring harvested plots represents 4 weeks harvest; data for spring is from 5 weeks harvest. Total marketable yield of the spring segment of the current fall & spring harvest is significantly lower than the other treatments in all three previous harvest regimes. This pattern is also reflected in the yield of the 15-24mm and 8-15mm diameter spears. The 'spring only' harvest within each previous harvest regime has a much greater proportion of the premium (8-24mm diameter) yield component composed of the larger 15-24mm diameter spears.

The high ratio of small to large spears in all of the fall harvested plots and the increased percentage of culls may simply reflect massive bud break after release from apical dominance with green fern removal. But this reduction in size of spears may also indicate that subsequent loss of vigor is imminent. The 4 to 1 ratio of yield of small to large marketable spears of the 'S91' is evidence of this.

The data suggests that the effects of double harvest within one year are immediate and are reflected in the reduced vigor and of the subsequent harvest. A better comparison of fall season yielding potential is expected in fall '91; the plots will have been in fern a full season as opposed to only 6 months fern growth after spring harvest last year.

Literature Cited

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Table 1.

Effects of harvest season and previous harvest regimes on yield of asparagus (Asparagus officinalis L. cv 'Mellowland Select') planted - 1986.

Previous/ Current Harvest regime	Marketable Yield			Culls
	Total	15-24mm	8-15mm	
	Metric ton/ha			
light*				
Fall only	1.7	0.5	1.2	0.4
Fall & Spring (F90)	1.6	0.4	1.2	0.4
Fall & Spring (S91)	1.1	0.2	0.9	0.2
Spring only	1.6	0.6	1.0	0.2
moderate				
Fall only	2.1	0.6	1.5	0.4
Fall & Spring (F90)	2.5	0.7	1.7	0.6
Fall & Spring (S91)	1.0	0.2	0.8	0.3
Spring only	1.7	0.8	0.9	0.1
heavy				
Fall only	1.0	0.2	0.8	0.4
Fall & Spring (F90)	1.7	0.4	1.3	0.6
Fall & Spring (S91)	0.9	0.2	0.8	0.3
Spring only	1.4	0.5	0.9	0.2

* light, moderate or heavy previous harvest was for 6, 8 or 10 weeks in Spring 1990 and 2 weeks less in each category in each of the previous 3 years.