

# ASPARAGUS HARVESTER EVALUATION

## EL CENTRO TEST

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### **BACKGROUND**

During the 2004 Washington asparagus harvest, a prototype single row asparagus harvester was evaluated in the Pasco/Mesa area. The harvester head employs parallel pairs of counter-rotating "brushes" that engage asparagus spears that have reached a specified height. When the optical system senses a spear as the machine moves down the row, it actuates a cutting system that drives the closest blade into the soil at the base of the spear. The spear is pulled through counter-rotating brushes onto a back stop and falls onto a conveyer that transports spears to the rear of the machine.

The recovery efficiency in 2004 was affected mostly by problems with reliability. Cylinders failed to actuate and cut, the optical system experienced interference from dirt and dust, and there was no way to maintain consistent header height above the bed. It was proposed that harvester efficiency be improved by upgrading the electronics, changing the number and angle of the knives, using faster cylinders and employing better air management to improve the reliability and increase the life of the cylinders. These changes were tested in El Centro, California in early 2005.

### **SUMMARY OF EL CENTRO TRIAL RESULTS**

The harvester was tested in a trial consisting of ten replicated plots for hand harvesting and ten replicated plots for the machine. The plots for each treatment were randomized in two ¼ mile rows of asparagus. Twenty plots were evaluated for spear yield during harvest and sorted for acceptable fresh grade, including butts, short spears, 9 and 8 inch spears and dropped spears. Pay weight was calculated for each plot.

The asparagus beds were raised and uneven, as were the furrows which was a problem for the machine since it was designed for use on flat ground such as in the Columbia Basin. The field was not prepared for mechanical harvesting, therefore it is estimated the conditions had a negative impact on the recovery. Flat ground or beds prepared for mechanical harvesting would increase the efficiency of the harvester dramatically. Nonetheless, the El Centro trials provided the ability to test the effectiveness of previous modifications prior to the Washington asparagus season.

### Results of El Centro Test

Economic analysis indicates that a four row harvester must recover 65% of hand harvested yield to be viable. Therefore, the daily mean pay weight of the machine harvested product from each plot was compared to the mean pay weight of the hand

harvested plots multiplied by 0.65 (65% of the hand harvested pay weight). Based on the composite of all five days, the harvester had a recovery efficiency of 56%, which is lower than the 65% requirement.

It was noted, however, that a large portion of what the harvester cut successfully was dropped. Based on the assumption dropped spears can be recovered after the machine has been modified, average recovery would be greater than 70%.

**Based on this analysis, it was recommended to proceed with modifications to the harvester and conduct a full scale evaluation in Pasco starting April, 2005.**

### **PASCO TEST- SPRING 2005**

The selective harvester will be tested for durability and for harvesting efficiency compared to a hand crew. A plot size of 2 acres will be used. Each row will be split and each half harvested by hand and machine. The harvested asparagus from each half row plot will be weighed and sub-sampled for and acceptable fresh grade including butts, short spears, 9 and 8 inch spears and dropped spears. Samples of hand and machine harvested asparagus will be provided to the WSU Horticulture team for post-harvest storage evaluation to compare shelf life and long-term quality.