

## **Evaluation of Pumpkin Cultivars No-till Direct-seeded and No-till Transplanted into Wheat Stubble, Indiana 2004**

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Double-cropping pumpkins after wheat provides an opportunity to harvest a high-value crop off of land that might otherwise remain uncropped. In northern Indiana, many jack-o-lantern pumpkin cultivars may not mature quickly enough to produce a crop when planted in mid-July. This project compared yield and fruit size of eight cultivars or lines when they were either direct-seeded or transplanted into wheat stubble.

**Materials and Methods.** The trial was conducted at the Pinney-Purdue Agricultural Center in Wanatah, Indiana. Wheat was harvested from the experimental area the first week of July, straw was baled and removed, and the area treated with glyphosate to kill emerged weeds. Urea was broadcast to supply N at 80 lb./A. The trial was set up as a randomized block design with 3 replications. Treatments were arranged in a split plot design. Planting method, either transplant (TR) or direct-seed (DS), was the main plot. Eight cultivars were the subplots. A single subplot was 18 ft. wide with two 24-ft. rows spaced 6 ft. apart in the center of the plot (432 sq. ft.). The trial was bordered by a single row of transplanted guard plots with various additional cultivars. On July 13<sup>th</sup>, in the DS treatment, two seeds per hill were handplanted in hills 4 ft. apart. Zinc phosphide was applied in each hill to deter predation by 13-lined ground squirrels. After emergence, plants were thinned to 6 per row (1210 plants/A). Also on July 13<sup>th</sup>, 3-week-old seedlings were transplanted 4 ft. apart using a mechanical transplanter designed for no-till planting. Ethalfluralin herbicide was applied prior to transplanting, except for an untreated band over the pumpkin rows, and was also broadcast after direct seeding. Plants were irrigated as needed using drip irrigation. Insects and diseases were controlled using standard practices for the area. Pumpkins were harvested on October 28. At harvest, pumpkins were graded into marketable and cull categories. Marketable fruit were further separated into “orange,” if over 90% of the surface was orange, and “turning,” if the pumpkin had begun to turn orange but less than 90% of the surface was orange. The purpose of including “turning” pumpkins in the marketable category is to provide information on potential yield of orange pumpkins if harvest had been delayed, or if growing conditions had led to faster pumpkin ripening. Immature and cull pumpkins were also harvested, but data for them are not shown. Average weight per pumpkin was calculated. Analyses of variance were used to test for significant effects of planting method, cultivar, and their interaction, followed by mean separation using Fisher’s protected LSD at  $P = .05$ . For dependent variables with unequal variances that prohibited use of ANOVA, means alone are presented.

**Results and Discussion.** Both direct-seeded and transplanted pumpkins established well in the wheat stubble. Weed control was poor, in large part due to a high population of lambsquarters that had emerged in the wheat and were not controlled by glyphosate applications prior to pumpkin planting. Transplanted cultivars with vigorous vines suppressed weed growth in the plots, but the wide rows between the plots and areas with less vigorous pumpkin growth allowed substantial weed biomass production. By August 3<sup>rd</sup> transplants had about 10 nodes and direct-seeded plants had 4 to 6 nodes. In

transplanted plots, the first female flowers on some cultivars were open by Aug. 14<sup>th</sup>. The 2004 growing season was exceptionally cool during the summer, but September was warm and dry. Frost killed pumpkin vines in early October, typical for this area.

Only 3 cultivars produced any orange fruit from direct-seeded plants: Gold Standard, Racer, and Gold Gem (Table 1). All cultivars produced orange fruit from transplants. Gold Standard, Magic Lantern and Racer all produced over 140 lb. per plot (7 tons/A). If both orange and turning fruit are considered, direct-seeded plants averaged about 75% of the number and 62% of the weight produced by transplants. The difference between direct-seed and transplant was significant only at the 10% level. Cultivars differed in the number of orange plus turning pumpkin produced, but not in the total weight produced. Gold Standard produced the greatest number, followed by Racer, Magic Lantern and Gold Gem, which were not significantly different. REX 1003 produced the fewest, but not significantly less than Gold Gem. Transplants of Gold Standard and Racer both had more than 80% of the pumpkins orange by the harvest date. Magic Lantern and Gold Gem were next, with 54% and 44%, respectively. Two pumpkin cultivars grown only in the guard rows also had more than 80% of the pumpkins orange by the harvest date: New Rocket and Golden Hawk (data not shown). Average weight per pumpkin was not affected by planting method. Gold Medal produced the largest pumpkins at 18.8 lb. and Racer produced the smallest, at 9.3 lb. Pumpkin fruit quality was generally fair to poor.

Direct-seeding jack-o-lantern pumpkins into wheat stubble in mid-July does not look promising. Transplanting pumpkins shows more promise, if an early variety is used. It is still quite risky due to the possibility of cool fall weather and early frost. Viruses were not a problem in this trial, but another drawback of late planting is the increased risk of yield loss due to virus infection. A higher plant population than used in this trial would be possible and would likely result in higher yields.

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Table 1. Weight and number of orange and turning pumpkins, and average pumpkin weight, for eight cultivars direct seeded (SD) or transplanted (TR) into wheat stubble, Wanatah, Indiana, 2004.

| Cultivar       | Seed Source* | Orange Pumpkin No. |      |      | Orange Pumpkin Wt. |     |      | Orange + Turning No. |      |      | Orange + Turning Wt. |     |      | Percent Orange |    |      | Ave. Frt. Wt. Orig + Turn. |                 |      |    |
|----------------|--------------|--------------------|------|------|--------------------|-----|------|----------------------|------|------|----------------------|-----|------|----------------|----|------|----------------------------|-----------------|------|----|
|                |              | SD                 | TR   | Ave. | SD                 | TR  | Ave. | SD                   | TR   | Ave. | SD                   | TR  | Ave. | SD             | TR | Ave. | SD                         | TR              | Ave. |    |
| Gold Standard  | RU           | 1.0                | 14.7 | 7.8  | 12.0               | 162 | 87   | 11.7                 | 17.3 | 14.5 | 116                  | 189 | 153  | 9.2            | 87 | 48   | 9.8                        | 11.1            | 10.4 |    |
| Magic Lantern  | RI           | 0.0                | 8.3  | 4.2  | 0.0                | 150 | 75   | 7.7                  | 16.0 | 11.8 | 100                  | 245 | 173  | 0.0            | 54 | 27   | 11.7                       | 15.7            | 13.7 |    |
| Racer          | JS           | 1.3                | 13.7 | 7.5  | 12.7               | 146 | 80   | 11.0                 | 17.0 | 14.0 | 95                   | 170 | 132  | 12.4           | 81 | 47   | 8.6                        | 9.9             | 9.3  |    |
| Gold Gem       | RU           | 0.3                | 5.0  | 2.7  | 4.7                | 94  | 49   | 11.0                 | 11.3 | 11.2 | 157                  | 203 | 180  | 2.4            | 44 | 23   | 13.5                       | 17.8            | 15.7 |    |
| REX 1003       | RU           | 0.0                | 1.0  | 0.4  | 0.0                | 82  | 41   | 7.0                  | 9.0  | 7.8  | 90                   | 174 | 132  | 0.0            | 10 | 4    | 13.5                       | 16.7            | 14.7 |    |
| Gold Medal     | RU           | 0.0                | 2.7  | 1.3  | 0.0                | 61  | 31   | 7.7                  | 10.3 | 9.0  | 135                  | 212 | 174  | 0.0            | 26 | 13   | 17.1                       | 20.6            | 18.8 |    |
| ACX 510        | AC           | 0.0                | 3.0  | 1.5  | 0.0                | 60  | 30   | 10.3                 | 10.0 | 10.2 | 142                  | 177 | 160  | 0.0            | 29 | 15   | 13.8                       | 17.6            | 15.7 |    |
| REX 1002       | RU           | 0.0                | 2.3  | 1.2  | 0.0                | 47  | 24   | 7.7                  | 9.0  | 8.3  | 107                  | 143 | 125  | 0.0            | 26 | 13   | 11.8                       | 15.7            | 13.8 |    |
| Average        |              | 0.3                | 6.3  |      | 3.7                | 100 |      | 9.3                  | 12.5 |      | 118                  | 189 |      | 3.0            | 45 |      | 12.5                       | 15.6            |      |    |
| Significance** |              |                    |      |      |                    |     |      |                      |      |      |                      |     |      |                |    |      |                            |                 |      |    |
| PM             |              |                    |      |      |                    |     |      | 0.0667               |      |      |                      |     |      |                |    |      | 0.0844                     |                 |      | ns |
| CV             |              |                    |      |      |                    |     |      | 0.0045, LSD 3.52     |      |      |                      |     |      |                |    |      |                            | 0.0001, LSD 2.9 |      |    |
| PM X CV        |              |                    |      |      |                    |     |      | ns                   |      |      |                      |     |      |                |    |      |                            | ns              |      |    |

\*JS=Johnny's Selected Seeds, RU=Rupp Seeds, RI=Rispens Seeds, AC=Abbott&Cobb.

\*\*P -value for main effect of planting method (PM), cultivar (CV) and their interaction, and values for LSD .05 for significant effects. ns=P >.10. If no significance level given, AOV not performed due to unequal variances.