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# F1/F2 Corn Variety Study

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**Abstract**
This study was initiated to quantify the agronomic performance penalties resulting from use of second-generation hybrid seed corn (saved seed). While this is not common practice in the United States, it is common in many corn-producing areas around the world. The agronomics of this practice were evaluated to determine the value (if any) of planting second-generation seed corn. A yield and grain quality study was conducted at the Iowa State University Northeast Research and Demonstration Farm near Nashua, Iowa to compare F1 (commercial seed), F2 (saved seed), and a combination of F1/F2 seed with three different corn hybrids differing in relative maturity (RM).

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# F1/F2 Corn Variety Study

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## Introduction

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## Materials and Methods

The soil consisted of a Floyd loam with 1% –4% slope; soil tests reported 38 ppm $P_20_5$ and 148 ppm $K_20$, and a pH of 6.75 in the fall of 1999. The experimental design was a randomized complete block with four replications. Plots were 40 feet long and four rows wide; the study was surrounded by a minimum of four rows. The study was a conventional tillage system, spring field cultivated prior to planting in a corn–soybean rotation. On April 26, 2001, 140 lbs of N/acre was applied as $NH^3$. Corn was planted May 15 at a depth of 1.5 inches in 30-inch rows, at 32,454 plants/acre. Corn was sprayed with 32 oz/acre Frontier 6.0SL at planting, followed by a postemergent application of 8 oz/acre of Clarity. The hybrids used in the study were Pioneer 3730 (99 RM), Novartis NK4242 (100 RM), and Pioneer 34B23 (108 RM). All seed used was treated with Maxim® XL for seed/seedling disease protection. Plots with the combination of F1 and F2 seed were planted with alternating rows of each generation of seed.

Final plant stand counts were taken on September 18. The center two rows of each plot were machine harvested for yield on October 30, with grain samples taken for quality analysis. Grain composition was analyzed at the Iowa State Grain Quality Lab using a Foss Infratec 1229 NIR. Plot yields (corrected to 15.0% moisture), final plant populations, and grain composition are shown in Tables 1–5.

## Results and Discussion

F1 hybrid corn yielded best when planted alone, regardless of hybrid. Overall, each treatment was significantly different, with the second generation (F2-saved seed) producing 29% less than F1 hybrid seed and the F1/F2 seed mixes yielding 17% less than the F1 seed. The 108 RM corn maturity yielded the highest, regardless of seed generation. Final plant population of the commercial seed was about 10% higher in comparison to the plots having F2 seed. Protein concentration was significantly greater and starch concentration was significantly reduced in the grain from the plots planted with 100% F2 saved seed. Generation of seed did not affect the oil concentration of harvested grain.

In summary, yields and final plant density decreased with increasing percentages of planted F2 seed. Protein percentage increased and starch percentage decreased with increasing percentages of planted F2 seed. Research in more locations and/or years would be helpful to validate these results.

**Table 1. Influence of F1, F2, or F1 × F2 seed mix on corn yield.**

| | Hybrid | | | | | | |
|---|---|---|---|---|---|---|---|
| Seed Generation | P3730 | | NK4242 | | P34B23 | | Average | |
| F1 | 147 | A | 149 | A | 191 | A | 163 | A |
| F1 x F2 | 124 | B | 130 | B | 150 | B | 135 | B |
| F2 | 113 | B | 120 | B | 113 | C | 115 | C |
| Average | 128 | | 133 | | 152 | | 137 | |

Different letters in the same column denote significant differences among seed sources (P = 0.05).

**Table 2. Influence of F1, F2, or F1 × F2 seed mix on final plant population.**

| | Hybrid | | | | | | |
|---|---|---|---|---|---|---|---|
| Seed Generation | P3730 | | NK4242 | | P34B23 | | Average | |
| F1 | 26223 | A | 26746 | A | 27835 | A | 26,935 | A |
| F1 x F2 | 24306 | A | 25373 | A | 23305 | B | 24,328 | B |
| F2 | 25526 | A | 22041 | B | 24045 | B | 23,870 | B |
| Average | 25352 | | 24720 | | 25062 | | 25,044 | |

Different letters in the same column denote significant differences among seed sources (P = 0.05).

**Table 3. Influence of F1, F2, or F1 × F2 seed mix on grain protein content (%).**

| | Hybrid | | | | | | |
|---|---|---|---|---|---|---|---|
| Seed Generation | P3730 | | NK4242 | | P34B23 | | Average | |
| F1 | 8.6 | A | 8.5 | A | 8.5 | A | 8.5 | A |
| F1 x F2 | 8.9 | A | 8.7 | A | 8.6 | A | 8.7 | A |
| F2 | 9.1 | A | 8.9 | A | 9.6 | B | 9.2 | B |
| Average | 8.8 | | 8.7 | | 8.8 | | 8.8 | |

Different letters in the same column denote significant differences among seed sources (P = 0.05).

**Table 4. Influence of F1, F2, or F1 × F2 seed mix on grain oil content (%).**

| | Hybrid | | | | | | |
|---|---|---|---|---|---|---|---|
| Seed Generation | P3730 | | NK4242 | | P34B23 | | Average | |
| F1 | 3.4 | A | 3.2 | A | 3.7 | A | 3.4 | A |
| F1 x F2 | 3.3 | A | 3.3 | A | 3.7 | A | 3.4 | A |
| F2 | 3.3 | A | 3.3 | A | 3.7 | A | 3.4 | A |
| Average | 3.3 | | 3.3 | | 3.7 | | 3.4 | |

Different letters in the same column denote significant differences among seed sources (P = 0.05).

**Table 5. Influence of F1, F2, or F1 × F2 seed mix on grain starch content (%).**

| | Hybrid | | | | | | |
|---|---|---|---|---|---|---|---|
| Seed Generation | P3730 | | NK4242 | | P34B23 | | Average | |
| F1 | 58.9 | A | 59.2 | A | 57.8 | A | 58.7 | A |
| F1 x F2 | 58.6 | AB | 58.8 | AB | 57.8 | A | 58.4 | A |
| F2 | 58.1 | B | 58.4 | B | 56.9 | B | 57.8 | B |
| Average | 58.5 | | 58.8 | | 57.5 | | 58.3 | |

Different letters in the same column denote significant differences among seed sources (P = 0.05).