



UNIVERSITY OF WISCONSIN AGRONOMY, SOYBEAN RESEARCH, UNIVERSITY OF WISCONSIN-EXTENSION

Agronomic Management of Natto Soybeans in Wisconsin - 2017

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The opportunity to grow identity preserved soybeans such as Natto exist for Wisconsin growers. Pricing premiums are one incentive that growers are offered for specialty soybeans. Economics and agronomics play a large role in the decision to grow a non-conventional crop. In this set of experiments food grade soybeans were planted at two WI locations in 2017. Three studies at each location were established with the following research objectives:

1. To evaluate the effect of soybean seeding rate coupled with fungicide + insecticide seed treatments on Natto soybean stand establishment, growth, and seed yield.
2. To evaluate the efficacy of Endura fungicide on white mold incidence and Natto seed yield.
3. To evaluate various seeding rates on four varieties of food grade soybean for seed yield, growth characteristics and grain composition.

Table 1. Agronomic site details of natto trials. 2017.

| | Arlington, WI | Chippewa Falls, WI |
|------------------------|----------------------------------|------------------------------------|
| Soil series/irrigation | Plano silt loam Non-irrigated | Plainfield sand Irrigated (+2") |
| Soil fertility | | |
| Phosphorus (ppm) | 67 | 28 |
| Potassium (ppm) | 163 | 169 |
| pH | 7.0 | 6.8 |
| Organic matter (%) | 3.6 | 2.8 |
| Tillage | Chisel plow | Chisel plow |
| Previous crop | Corn | Corn |
| Planting date | 8-May | 8-May |
| Harvest date | 15-Sept | 11-Oct |

A plot planter with seed cone divider was used to plant the plots. Statistically valid randomization was used and 4 reps of each treatment were planted. Treatments and significance of F value for soybean seed yield, protein and oil composition, seed size, and disease incidence are shown in Tables 2-4.

Varieties used in these studies included SB80, SB0512, and SB4020 from SB&B Foods, Inc. and DuPont Pioneer variety 91M10. All varieties are non-GMO and have select niches in the food grade market.

Table 2. Seeding rate and seed treatment effects on soybean seed yield, protein and oil composition, seed size, and white mold incidence of variety SB80 in 2017.

| Seed rate | Seed treatment * | Grain yield | Grain | | Seed size | White mold |
|-----------|------------------|-------------|---------|------|-----------|------------|
| | | | protein | oil | | |
| seeds/a | | bu/a | % | % | seeds/lb | % |
| 100 | | 41.8 C | 36.6 | 17.3 | 3995 | 11 |
| 140 | | 44.2 BC | 36.6 | 17.2 | 4055 | 14 |
| 180 | | 46.1 AB | 36.7 | 17.0 | 4121 | 16 |
| 220 | | 46.4 AB | 36.6 | 17.1 | 4054 | 15 |
| 260 | | 48.1 A | 36.7 | 17.1 | 4067 | 18 |
| | NTC | 45.0 | 36.7 | 17.1 | 4049 | 14 |
| | F/I | 45.6 | 36.6 | 17.2 | 4068 | 16 |
| 100 | NTC | 40.8 | 36.6 | 17.3 | 3936 | 10 |
| 100 | F/I | 42.8 | 36.5 | 17.3 | 4054 | 13 |
| 140 | NTC | 43.5 | 36.5 | 17.1 | 4142 | 11 |
| 140 | F/I | 44.9 | 36.7 | 17.3 | 3968 | 18 |
| 180 | NTC | 45.8 | 36.9 | 17.0 | 4143 | 15 |
| 180 | F/I | 46.4 | 36.6 | 17.1 | 4098 | 18 |
| 220 | NTC | 47.6 | 36.6 | 17.1 | 3858 | 14 |
| 220 | F/I | 45.2 | 36.6 | 17.1 | 4251 | 15 |
| 260 | NTC | 47.5 | 36.8 | 17.0 | 4166 | 18 |
| 260 | F/I | 48.7 | 36.6 | 17.2 | 3969 | 18 |
| Means | | 45.3 | 36.6 | 17.1 | 4059 | 15 |

Pr>F

| | | | | | |
|----------------|--------|--------|--------|--------|--------|
| Seed rate | 0.0028 | 0.6476 | 0.0876 | 0.3918 | 0.1166 |
| Seed treatment | 0.4975 | 0.5065 | 0.0707 | 0.6252 | 0.0690 |
| SR x ST | 0.3074 | 0.4342 | 0.6415 | 0.1559 | 0.6075 |

* Seed treatment - CruiserMaxx (Syngenta) 2.95 fl oz/cwt

Means with the same letter are not statistically different

All treatments are planted with SB80 variety

Table 3. Foliar fungicide and variety effect on soybean seed yield, protein and oil composition, seed size, and white mold incidence in 2017.

| Foliar fung | Variety | Grain yield | Grain | | Seed size | White mold |
|-------------|---------|-------------|---------|--------|-----------|------------|
| | | | protein | oil | | |
| | | bu/a | % | % | seeds/lb | % |
| NTC | | 50.8 A | 36.4 | 17.0 | 4546 | 6 |
| Endura | | 53.4 B | 36.5 | 17.0 | 4447 | 5 |
| | SB80 | 49.4 B | 36.7 B | 17.0 B | 3994 B | 4 B |
| | SB0512 | 58.1 A | 37.0 A | 16.2 C | 4798 A | 2 C |
| | SB4020 | 48.8 B | 35.7 C | 17.9 A | 4697 A | 11 A |
| NTC | SB80 | 48.4 C | 36.7 | 17.0 | 4069 | 5 |
| NTC | SB0512 | 55.2 B | 37.0 | 16.1 | 4811 | 1 |
| NTC | SB4020 | 49.0 C | 35.6 | 17.9 | 4758 | 12 |
| Endura | SB80 | 50.5 BC | 36.7 | 17.1 | 3919 | 4 |
| Endura | SB0512 | 61.0 A | 37.1 | 16.3 | 4785 | 2 |
| Endura | SB4020 | 48.7 C | 35.8 | 17.8 | 4636 | 10 |
| Means | | 52.1 | 36.5 | 17.0 | 4496 | 6 |

Pr>F

| | | | | | |
|-------------|--------|--------|--------|--------|--------|
| Foliar fung | 0.0317 | 0.4276 | 0.5701 | 0.1088 | 0.5223 |
| Variety | 0.0003 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| FF x Var | 0.0479 | 0.8018 | 0.2044 | 0.5671 | 0.2755 |

* Foliar fungicide - Endura (BASF) 5.5 oz/a at R1

All seeded at 220,000 seeds/a

Means with the same letter are not statistically different

Table 4. Seeding rate and variety effects on soybean seed yield, protein and oil composition, seed size, and white mold incidence in 2017.

| Seed rate | Variety | Grain yield | Grain | | Seed size | White mold |
|----------------|---------|-------------|---------|--------|-----------|------------|
| | | | protein | oil | | |
| seeds/a | | bu/a | % | % | seeds/lb | % |
| 180 | | 51.1 B | 35.8 B | 17.6 | 4135 | 8 |
| 220 | | 54.3 A | 35.9 B | 17.5 | 4102 | 7 |
| 260 | | 54.7 A | 36.1 A | 17.5 | 4125 | 8 |
| | P91M10 | 68.2 A | 35.5 B | 18.7 A | 2549 C | 1 |
| | SB80 | 45.5 C | 36.3 A | 17.2 C | 4162 B | 11 |
| | SB0512 | 53.6 B | 36.7 A | 16.3 D | 4969 A | 4 |
| | SB4020 | 46.1 C | 35.4 B | 18.0 B | 4804 A | 14 |
| 180 | P91M10 | 64.0 | 35.2 | 18.9 | 2574 | 1 |
| 180 | SB80 | 44.4 | 36.4 | 17.2 | 4228 | 15 |
| 180 | SB0512 | 51.7 | 36.6 | 16.2 | 5008 | 4 |
| 180 | SB4020 | 44.2 | 35.3 | 18.0 | 4731 | 13 |
| 220 | P91M10 | 68.7 | 35.4 | 18.5 | 2524 | 0 |
| 220 | SB80 | 46.2 | 36.2 | 17.2 | 4086 | 7 |
| 220 | SB0512 | 55.1 | 36.7 | 16.4 | 4948 | 3 |
| 220 | SB4020 | 47.2 | 35.3 | 18.0 | 4851 | 16 |
| 260 | P91M10 | 71.8 | 35.8 | 18.6 | 2548 | 1 |
| 260 | SB80 | 45.8 | 36.4 | 17.2 | 4172 | 12 |
| 260 | SB0512 | 54.1 | 36.8 | 16.2 | 4952 | 6 |
| 260 | SB4020 | 46.8 | 35.4 | 17.9 | 4830 | 11 |
| Means | | 53.3 | 36.0 | 17.5 | 4121 | 7 |
| Pr>F | | | | | | |
| Seed rate | | 0.0043 | 0.0471 | 0.2448 | 0.6106 | 0.8360 |
| Variety | | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.1435 |
| SR x Var | | 0.1303 | 0.4611 | 0.1007 | 0.8721 | 0.6069 |

Means with the same letter are not statistically different

Summary of Year 1.

Objective 1. Seeding rate by seed treatment effects

- No effect on seed yield was seen from the addition of a fungicide/insecticide seed treatment at any seeding rate.

Objective 2. Foliar fungicide by variety effects

- Varieties differed in their yield response to Endura foliar fungicide. Only one variety (SB0512) responded positively to the applied fungicide. Main effects of both variety and foliar fungicide were significant for yield.

Objective 3. Seeding rate by variety effects

- The interaction of varieties and seeding rates were not significant, however, individually, each main effect was significant for yield. Across all four food grade varieties seeding rates of 220,000 seeds/a and greater resulted in maximum yields

These studies will be repeated in 2018 pending WSMB funding decisions.