

2015 Research Report to Maine Potato Board

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Effects of Crop Rotation on Potato Pink Rot (*Phytophthora erythroseptica*)

A field trial was conducted in Aroostook Research Farm, Presque Isle, ME in 2014 and 2015 to evaluate the effects of crop rotation. There were two fields (A and B) in the trial. In field A, different crops were grown in 2014, including alfalfa (*Medicago sativa*), barley (*Hordeum vulgare*)/ryegrass (*Lolium multiflorum*), canola (*Brassica napus*), red clover (*Trifolium pratense*), onion (*Allium cepa*), and sweet corn (*Zea mays*) and oat (*Avena sativa*), followed by potato in 2015. In field B, potato was planted in 2014 and the above rotation crops were grown in 2015. Randomized complete block design was applied with four replications. Plots size was six 3-ft-wide rows with 20 feet in length, and one foot of plant spacing. The middle two rows of each plot were inoculated with *Phytophthora erythroseptica* inoculum. Potato (cv. 'Russet Norkotah') seed pieces were planted on 05/29/2015. Fertilizer (14:14:14) was applied at 1,100 lb/A, followed by placing the treated seed pieces by hand. All plots were treated with Bravo ZN (1.5 pt/A) during the season to control late blight. The plots were maintained using standard production practices. The emergence was evaluated on 06/26/2015 and 07/10/2015. Emergence was a count of the emerged plants per row of the 20 seed pieces planted and converted to percentage.

Potato vines were killed by applying Reglone (1.5 lb/A) on 15 and 20 September. Potato tubers in the middle two rows of each treatment were dug by a harvester and picked by hand on 24 September. The harvested tubers were mechanically washed, sized. The severity of pink rot was rated on 1st October. The rating scales for disease were based on the percentage of rotted area on tubers: 0 (no symptom), 1 (1 to 5%), 2 (6 to 25), 3 (26 to 50%), 4 (51 to 75%), and 5 (>75%). Disease index = $100 \times \sum(r_i \times n_i) / (N \times 5)$, where N = total number of plants evaluated, r is the level of severity from 0 to 5, and i = specific level of severity (from 0 to 5), n = number of corresponding grade plants evaluated. Marketable yield and total yield were measured. Data were analyzed using JMP. ANOVA with Fisher's LSD and Wilcoxon Each Pair test were conducted to compare the effects of treatments at $\alpha = 0.05$.

There was no treatment effect on pink rot severity due to a large variation of the measurement, although the disease severity was very different. There was a significant difference of yield by using different rotation crops. Alfalfa increased the marketable yield significantly. In 2016, both fields will be planted with potato and disease and yield will be evaluated.

Table 1. Disease and yield evaluation in field B, Aroostook Farm 2015

Treatments	Emergence (%)	Pink rot index (%)	Marketable yield (lb)
Oat	82.50 ab*	0.35	26.5 ab
Canola	68.75 b	5.52	27.2 ab
Corn	78.75 b	2.80	31.4 ab
Clover	80.00 ab	2.43	36.0 ab
Onion	81.25 ab	2.95	35.1 ab
Alfalfa	73.75 ab	5.23	38.1 a
Barley & ryegrass	85.00 a	1.23	27.0 ab
Potato	80.00 ab	5.96	24.0 b

*Treatments not connected by the same letter are significantly different ($\alpha = 0.05$).