# Fall Cover Crop Influence on Spring Potato Production

**RFR-A1424**

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## Introduction

Use of cover crops is becoming a common practice among vegetable producers. Cover crops provide multiple benefits such as building of organic matter, erosion and weed suppression, nitrogen fixation, and improvement of soil health. Cereal rye is the most widely planted cover crop in Iowa, however, cover crops such as oats, oilseed radish, and clovers are gaining popularity. The goal of this project was to evaluate and study three fall-planted cover crops and their effect on spring-planted potato. The three cover crops studied were Cereal Rye, Oilseed Radish, and Crimson Clover. The control treatment for the study was a no-cover crop plot. The treatments were chosen based on their optimal growing season as well as flexibility to fit in a vegetable crop rotation.

The study also investigated the cover crop effect on two different potato cultivars (cv. Red Pontiac and Yukon Gold) that are popular cultivars among Iowa growers.

## Materials and Methods

The entire plot was tilled on August 23, 2013. Cover crops were seeded the same day using a drop spreader (Gandy®) and lightly harrowed-in to incorporate the cover crop seeds. The control plots were tilled at this time and not tilled again until cover crop termination. Solid set irrigation was installed and used as needed to supply water to the cover crops at seeding. In mid-October, above ground biomass was collected using 50 cm × 50 cm quadrats from two locations within the control, oilseed radish and crimson clover treatments across all four replications. The biomass was sorted into three groups consisting of cover crop, broadleaf weeds, and grass weeds. Cover crop and weed plant number were taken at this time. The cover crop and weed biomass was dried and weighed. Because cereal rye's maximum biomass would not be reached until the following spring, in mid-April the biomass and weed count were taken for rye. Cover crops were tilled to a depth approximately 6-8 in. On May 7, the plot was fertilized with 50 kg/ha (45 lb/acre) nitrogen and 60 kg/ha (54 lb/acre) each of $K_20$ and $P_20_5$. Potatoes were planted in rows 40 in. apart with tubers 9 in. apart within the row. Initial planting on May 7 failed due to an invasive soft rot pathogen on the tubers and the experiment was replanted on June 11. The experiment design was a Latin square split plot with four replications. The whole plot factor was the cover crop and cultivar was the subplot factor.

At four weeks after planting, the plot was mechanically weeded. Prior to cultivating, weed population was recorded by counting weeds in 50 cm × 50 cm meter quadrats laid across the plots. At seven weeks after planting, the same weed population measurements were repeated. At this time nitrogen was sidedressed at the rate of 84 kg/ha (75 lb/acre) via urea and mixed in during cultivation. At 17 weeks after planting, weed populations were once again taken and the potatoes harvested. Potatoes were graded by size into A and B categories as described by the U. S. Standards for Grades of Potatoes. A third category included potatoes that were nonmarketable (misshapen, insect damage, disease, or small size).

## Results and Discussion

The use of irrigation was not the preferred choice to establish the cover crops but the late summer's dry conditions would not have permitted the growth of a cover crop. With the warm weather at the time of planting,

germination was not optimal, especially in the crimson clover treatment. The cover crops put on good growth during the fall before going dormant for the winter. The following spring when the potatoes were well established and a weed pressure was present, the weed counts were taken in representative areas of each plot.

The data reveals that oilseed radish decreased the weed populations by over 70 percent when compared with the control (Figure 1). This effect was statistically significant. Rye decreased weeds, and crimson clover increased weed populations when compared with the control but were not statistically significant. The weeds occurring the most were redroot pigweed (*Amaranthus retroflexus*), common purslane (*Portulaca oleracea*), and witchgrass (*Panicum capillare*).

Between the two potato cultivars studied, Red Pontiac yielded better than the Yukon Gold. The lower Yukon Gold yield may be attributable to the poor stand establishment, even after the second planting for the season. The Grade A potato information is presented for both cultivars.

Among the Yukon Gold cultivar, oilseed radish and rye treatments increased yields compared with the control (Figure 2). Crimson Clover decreased yield compared with the control. All yield differences for the Yukon Gold potatoes were statistically non-significant.

Oilseed radish treatment increased yield of Red Pontiac cultivar compared with the control (Figure 3). Rye and crimson clover decreased yield when compared with the control. All yield differences for the Red Pontiac cultivar were not statistically significant.

**Acknowledgements**

I would like to thank Nick Howell and the 2014 farm crew for their help with the plot in collecting data. I would also like to thank my graduate and undergraduate colleagues in the Sustainable Vegetable Production Lab for their help with the project.

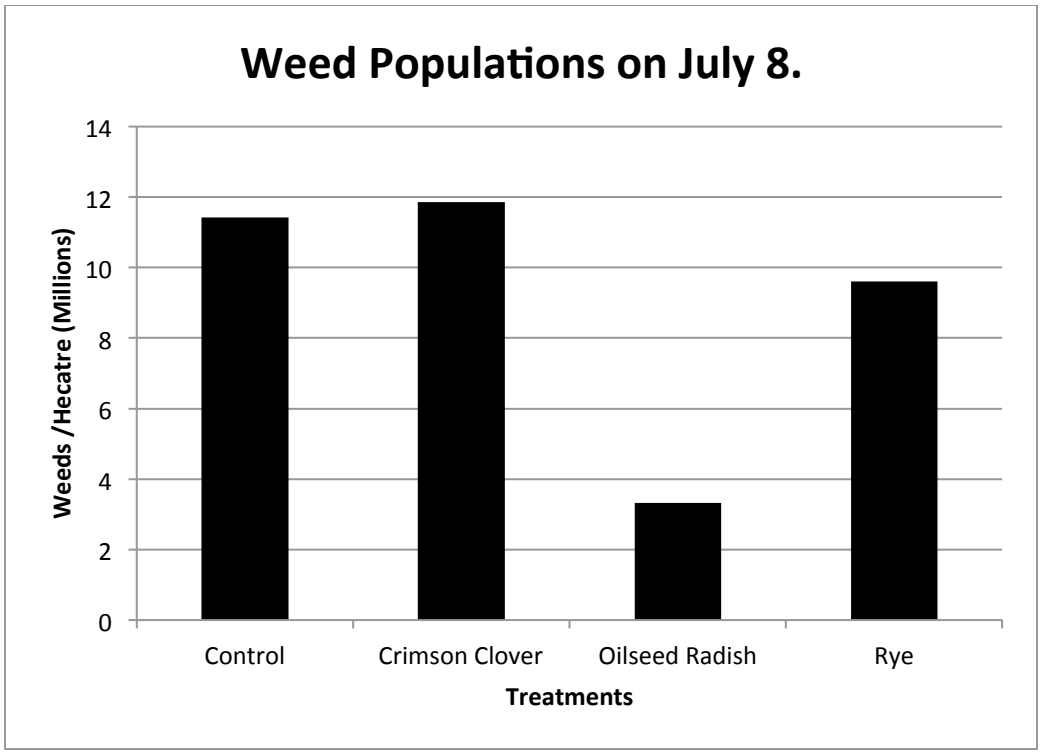


**Figure 1. Effect of cover crop on weed populations in growing potatoes four weeks after planting.**

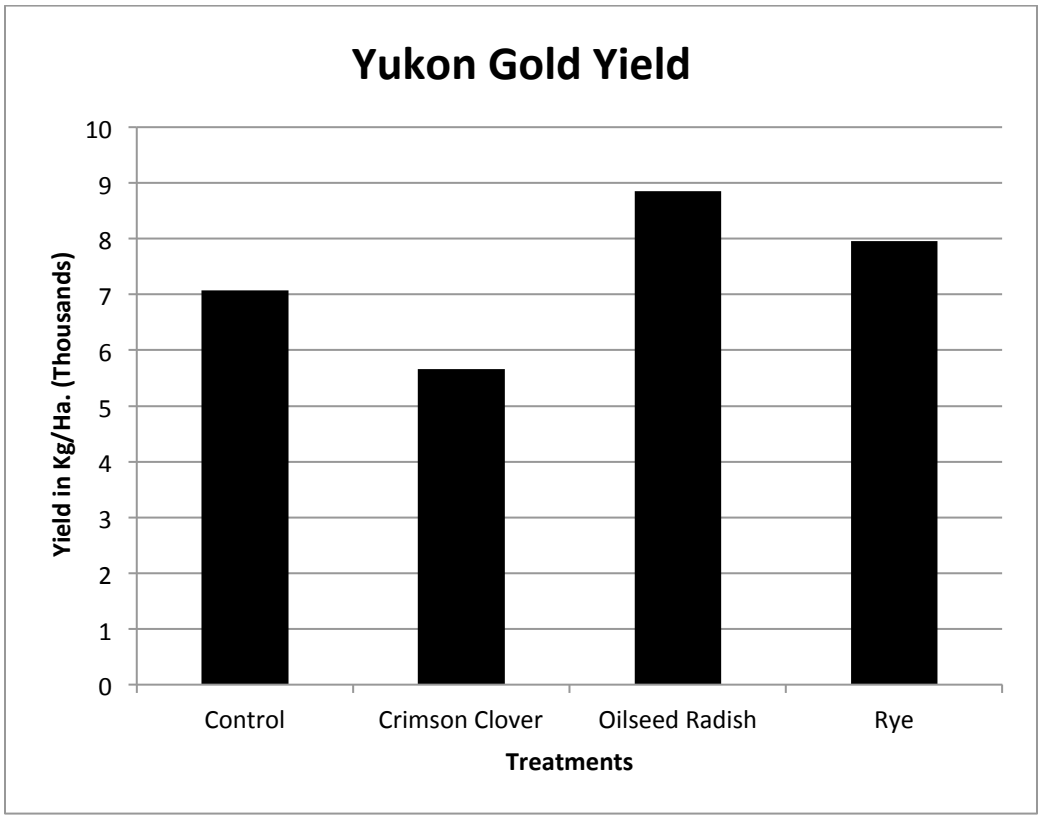


**Figure 2. Effect of cover crops on marketable Grade-A Yukon Gold potatoes.**

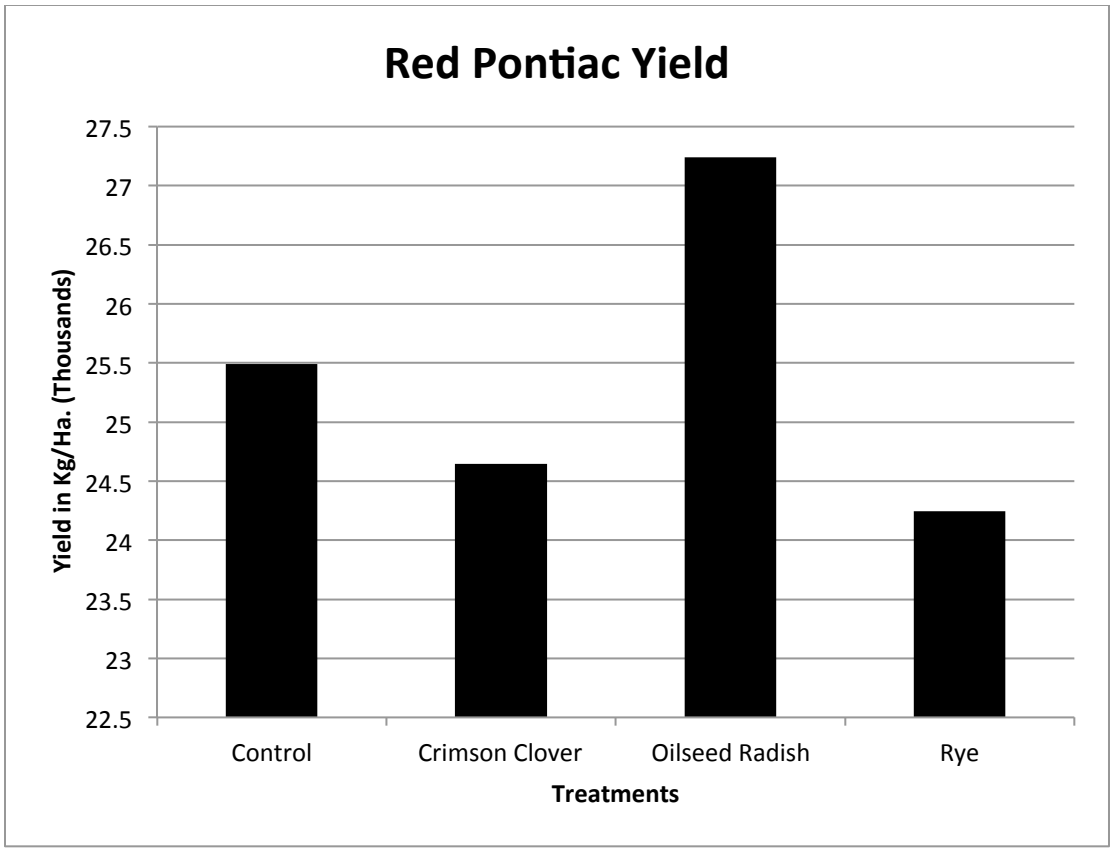


**Figure 3. Effect of cover crops on marketable Grade-A Red Pontiac potatoes.**