# Is there an economic benefit to variable rate seeding in white and black dry beans?

In recent years, Ontario dry bean growers have been successfully reducing seeding rates and using variable rate (VR) seeding methods. A three-year, multi-site project was conducted to evaluate the economics of reduced rate and variable rate seeding and determine if historical yield zones or soil parameters across a field should drive variable rate seeding.

## The simple answer

There was little economic benefit to varying seeding rates within a field of white or black beans, based on historical yield zones. The economically optimum blanket seeding rate ranged from **88,000-94,000 seeds per acre**.



# A little more information

Over a three-year period, the relationship between seeding rate and profit was evaluated in farm fields in Huron and Perth counties. Eight fields were included in the project, six with white beans and two with black beans. Beans were planted in 30" rows with four different seeding rates and included producers' preferred varieties (Nautica, Mist, Apex, T9905, Zorro). There were 60 plots per field – each approximately ½ acre in size – and yield data was collected from producers' combines.



## Maximum economic return

Plots were divided into historically high (A), average (B) and low (C) yield zones. The graph is an example of the net economic returns by seeding rate in each yield zone for one of the fields.



## Net economic return by seeding rates in historical yield zones

- The historically lowest yield areas (**C**) were not the lowest yielding in this case, and historical yield zones did not reflect what was observed in many of the plots for this project.
- Green areas of the curves indicate returns that are within \$10/ac of the maximum – and demonstrate the wide range of seeding flexibility (without a negative impact on returns) for white and black beans.
- The overlap in green areas across zones shows that picking one seeding rate for a whole field may be the best option.
- The historically highest yielding zones of this field (A) delivered higher yields and returns at higher seeding rates – which is contrary to common ideas on VR seeding for dry beans.

## Emergence

- 74% average emergence at 44,000 seeds/ac
- 84% average emergence at 120,000 seeds/ac

# The full story

The benefits of variable rate seeding may be minimal, and a single seeding rate for white and black beans came close to optimizing economic return across different historical yield zones. Here are the overall conclusions for this project, based on factors related to variable rate seeding.



## VR by yield zone

If you select the optimal seeding rate for each yield zone (e.g. as in the graph) and seed zones at those rates, the net return increases by \$7/ac on average, assuming each yield zone is an equal size. The highest increase in net return using optimal seeding rate by yield zone was \$21/ac on one field. It can be difficult to determine the optimal seeding rate for each yield zone of a field, and the return on investment in the project was low. If a producer does not already own VR planting equipment, there may be more advantage in refining the optimal blanket seeding rate for a given field.

## VR and SoilOptix data

Soil parameters were evaluated using SoilOptix – a device measuring gamma radiation from the soil calibrated against soil samples taken from the field. Values were collected on elevation, % clay, loam, sand and silt, OM, pH, CEC, K, P, S, B, Ca, Mg, Fe, Mn, Zn, K:Mg, Ca:Mg, leakability and plant available water. Plant available water was weakly correlated with economically optimal seeding rate where more water may support higher optimal seeding rates.

## Maturity

At lower populations, plants branch more and may take longer to mature – significantly reducing seeding rates in shorter season regions may results in issues at harvest.

## Weeds

In two of the eight fields, annual weed density was higher in plots with the lowest seeding rate (44,000 seeds/ac) – and rates this low are NOT recommended. Dry bean row closure on 30" rows is slow, and seeding rate is not likely a significant factor in weed control.

## White mould

There was no correlation between the severity of white mould and seeding rate or population. Lush growth and thick canopies can result in higher risk of white mould, but early season rain and fertility often have a greater impact on vegetative growth than seeding rate.











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