Farmers’ willingness to grow oilseeds as biofuel feedstocks for jet fuel production: A latent class approach

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Introduction
Certified hydrotreated renewable jet (HRJ) fuels from plant oils have been commercially demonstrated and certified for aviation use. HRJ is increasingly popular as an alternative fuel primarily due to its operational, environmental, and economic benefits.

Biofuel can be produced from a variety of feedstocks which account for 80-85% of the total biofuel production cost. This production cost increases as the cost of feedstocks increases due to the competition with other industries as well as their limited supply (Soriano and Narami, 2012). Consequently, prices of HRJ fuels are not competitive with petroleum-based fuels which compromise their production at a larger scale.

As a consequence, there is a need to establish a dependable supply of high quality and low cost feedstocks (e.g. oilseeds) to help the biofuel industry meet the demand at competitive prices.

Oilseeds are increasing interest as feedstock crop for production of renewable fuels due to their diverse oil compositional structure that provides optimal oil properties for certified HRJ fuel conversion efficiency (Demirbas, 2007). Various oilseeds such as canola and camelina have been already successfully adapted to the western wheat belt region of the U.S.

Although there are some studies that have looked at farmers’ willingness to grow other feedstocks for biofuel production (e.g. energy sorghum, switchgrass, corn stover, etc.), few if any studies are focused on determining the farmers’ willingness to grow oilseeds for producing bio-jet fuel.

Purpose
To evaluate the farmers’ willingness to adopt specialized oilseed crops usable for HRJ production into existing wheat based production systems under certain crop and contract attributes.

Objectives
1. To explore the general insights regarding producer preferences over the attributes of oilseed contracts by determining how oilseed variety characteristics and contract features can affect the decision of adopting oilseeds into the rotation system.

Model
A choice experiment method is used to investigate producers’ willingness to adopt oilseeds. Particularly, a latent class model (LCM) approach is used to account for the heterogeneity of the preferences in the sample. According to Greene and Hensher (2003), the choice probability of the individual i, among choice J alternatives, at choice situation Ti, given that she/he is in the class q is given by the following equation:

\[
P(\text{choice} | y, i, q) = \frac{\exp(t_i' \beta_i)}{\sum_{j=1}^{J} \exp(t_j' \beta_j)}
\]

The probability for the specific choice made by an individual is:

\[
P(q | y, i) = \text{Prob}(y | \text{class} q)
\]

Results and conclusions
The LCM was estimated for up to five segments per each region. The Akaike Information Criterion (AIC) was used to choose the best fitting LCM. For all regions, the LCM model includes variables such as: 22 to 57 years old wheat producers, the average yearly total gross value of sales coming from the producers’ agricultural operation, and farm size measured on total acres. In the case of the Pacific Northwest region, gender and off farm work were also included in the model. Results for the LCM are shown in table 2.