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# **Canning Quality Traits of Field Pea Cultivars Grown at Various Locations in Saskatchewan**

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## **Introduction**

Dry green peas account for one-third of the total area and production in Saskatchewan in 1997 (Saskatchewan Agriculture and Food, 1997). The area is expected to increase by 10% (Slinkard and Vandenberg, 1998). One reason for this increased pea production is value-added processing (Ah-Khan and Slinkard, 1995).

The objective of this research is to develop a canning procedure for dry green peas that could be used to measure differences in the canning quality due to cultivars and location.

## **Materials and Methods**

### **Field Pea Regional Trials**

Five cultivars (Obelisque, Olivin, Clipper, Keoma and CDC Peko) of dry green peas were seeded at seventeen locations (Battleford, Canora, Carlyle, Jedburgh, Kelvington, Kernen, Lashburn, Loon Lake, Luseland, Melfort, Nipawin, Regina, Rosthem, Scott, Shellbrook, Wadena and Wynyard) as part of the 1996 Regional Field Pea Test. At each location, plots were combined and seeds were packaged and sent to the Dept. of Crop and Horticulture Sciences and Plant Ecology Field Lab. Seeds were cleaned and representative samples (200-300 g) were obtained for canning quality tests.

### **Hundred-seed Weight**

The hundred seed weights of each cultivar at each location were determined. Results were reported as 100-seed weights in g.

### **Determination of Surface Colour of Dry Seeds**

The colour of the dry green seeds (seed coat on) was determined using the HunterLab colorimeter (ColorQUEST Model 45/0, Hunter Associates Laboratory, Inc., Reston, VA) using the white tile as standard (HunterLab Color Standard No. C49006). One hundred g of seeds were weighed and subsequently transferred to a Petri plate. Duplicate readings were obtained. The second reading was obtained after rotating the Petri plate 90°. Results were

reported as 'L' (100 = white; 0 = black), 'a' (+a = red; -a = green) and 'b' (+b = green; -b = yellow).

### **Moisture Determination**

Three samples from each location were selected at random. The moisture contents were determined by the AACC (1995) procedure for moisture (Method 44-15A). The moisture contents calculated for each location were used to calculate the total solids content for all the cultivars at each given location.

### **Thermal Processing**

Dry green peas containing the appropriate level of total solids were placed in ham nets. The ham nets were grouped into five and subsequently placed in 4 l of tap water and allowed to soak for 16 hours at room temperature. After the soaking period, the ham nets were transferred to a preheated (82°C) water bath where the samples were blanched for 8 min. After blanching, the samples were transferred into their respective 211 x 400 cans (10 fl. oz, 284 ml) to which 2.16 g of salt had been added. The weight of the soaked sample divided by the initial weight yield the hydration coefficient.

The blanched peas were covered with tap water (90°C) until a 5 mm headspace was obtained. The cans were sealed (Dixie Double Seamer, Model 25D, Athens, GA) and processed at 118°C for 20 min. Cans were stored upside-down at room temperature for two weeks prior to analyses.

### **Determination of WDWT and PWDWT**

After the two week storage period, the cans were opened after which the can contents were transferred to a 8-mesh screen positioned at a 150 angle, rinsed with distilled water and allowed to drain for 5 min before the rinsed peas were weighed to give the washed drained weight (WDWT). The percent washed drained weight (PWDWT) was calculated by multiplying the ratio of the washed drained weight/weight of can contents by 100. WDWT is reported in g while PWDWT is reported as %.

### **Visual Measurement of Appearance**

While draining the samples, the appearance of the canned green peas was evaluated on a scale from 1 to 5 with 1 = 90% of seeds intact and no free seed coats, 2 = 70-89% of seeds intact and no free seed coats, 3 = 60-69% of seeds intact and no free seed coats, 4 = seeds split badly, but holding together and no free seed coats and 5 = seeds blown apart and free seed coats present.

### **Determination of Surface Colour of Cooked Seeds**

The surface colour of the cooked seeds (seed coat on) was determined following the

procedure for dry green seeds described above. After colour determination, the seeds were used for texture determination as described below.

### **Determination of Texture**

One hundred g of the rinsed peas were transferred to the Kramer shear cell which was then placed in the texture test system (Food Technology Corporation, Model TMS-90, Rockville, MD) equipped with a 454 kg transducer set at a speed of 0.60 cm/min. Results were expressed in kgs/100 g sample.

### **Statistical Analyses**

Data were analysed using Minitab for Windows (Release 11.2, State College, PA).

## **Results and Discussion**

### **Effect of Cultivar**

The canning quality traits of the five cultivars used in the regional trials are shown in Table 1. The one-hundred seed weights and the hydration coefficients were significantly different ( $P < 0.05$ ) with the cultivar Obelisque having the largest seeds and highest hydration coefficients while cultivar CDC Peko had the smallest seeds and lowest hydration coefficients. The three other cultivars, Olivin, Clipper and Keoma, had intermediate seed weights and hydration coefficients. However, there was no significant correlation between 100-seed weight and the hydration coefficient.

The dry green seeds of Keoma and CDC Peko had significantly lower 'L' values, indicating that these seeds were darker. The 'a' values of CDC Peko were also significantly lower and the 'b' values significantly higher than the corresponding values of the other cultivars, indicating that the dry seeds of CDC Peko were 'greener' and 'more yellow' than the other cultivars. There was also a significant negative correlation between the 'a' and 'b' values of the dry seeds.

The washed drained weights (WDWT) and percent washed drained weights (PWDWT) of cultivars Obelisque, Olivin and Clipper were significantly ( $P < 0.05$ ) greater than those of Keoma and CDC Peko while the texture readings of the first three cultivars were also lower ( $P < 0.05$ ) than the last two. There is also a significant correlation between WDWT/PWDWT and the texture readings. There were no significant differences in 'L', 'a' and 'b' values among the cooked seeds from the different cultivars with the exception of the 'a' values of Obelisque and CDC Peko which were smaller. There was also a significant correlation between the uncooked and cooked 'L' values, indicating that lighter-coloured seeds tend to be lighter after canning.

Finally, the appearance ratings of the canned seeds of cultivar Keoma and CDC Peko were significantly lower than the other three cultivars, indicating that the seeds are less intact

after canning. The appearance ratings were also found to be significantly correlated to HSW, WDWT and PWDWT but negatively correlated to texture. These correlations suggest that larger seeds yield a higher WDWT and PWDWT but lower texture and appearance ratings.

### **Effect of Location**

The effect of location on the various canning quality traits is given in Table 2. The hundred-seed weights varied from 18.6 g for Lashburn to as high as 29.2 g for Battleford. The seeds with the highest hydration coefficients were obtained in Lashburn while the lowest HCs were obtained at Carlyle, Luseland and Nipawin. Dry seeds from Kelvington had the highest 'L' values while the seeds from Melfort and Nipawin had the darkest coloured seeds. The 'a' values also varied significantly with the highest 'a' (most red) obtained at Rosthern and the lowest 'a' (most green) at Canora. The 'b' values of the uncooked seeds from the various locations were similar.

The highest WDWT/PWDWT were obtained at a few locations (Table 2) while the lowest values were obtained at Carlyle, Kelvington, Luseland and Nipawin. Likewise, the highest texture readings were obtained at these four locations.

There were significant differences in the 'L', 'a' and 'b' values of canned seeds from the different locations. The 'L' values ranged from 38.3 at Melfort to 43.0 at Battleford. The 'a' values varied from 1.9 at Loon Lake to 3.3 at Luseland while the 'b' values ranged from 16.4 at Luseland to 18.1 at Wadena. Finally, the appearance ratings varied from 2.7 at Luseland to as high of 4.5 at Battleford.

The C x L interaction for every canning quality trait, except for the 'b' values for surface colour of the dry seeds, were found to be significant.

### **Conclusions**

Cultivar (C), location (L) and CxL interaction all have significant effects on the canning quality traits of Saskatchewan grown field peas. The cultivars Obelisque, Oiivin and Clipper have better canning quality traits than either Keoma or P4 1 G-9. These canning quality traits have also been shown to vary depending on location.

The 1997 field pea regional trials have already been harvested and will be canned. Additional information, especially regarding the effect of environment and CxL interaction will be gathered.

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