Product & Processing Functionality

Introduction

Due to the potential benefits for human food consumption, preliminary work has been conducted on canaryseed's milling performance, flour functionalities, and extruded snack and cereal product opportunities. Research is ongoing to establish how canaryseed can be transformed into flours suitable for bakery, snack, and pasta applications. As well, work is being completed to compare flour functionalities with other grains.

Milling Opportunities

Canaryseed produces small elliptical grains with lengths and widths of 4.0-5.1 mm and 1.5-2.0 mm respectively. Abrasive dehulling followed by air aspiration produces hull-free grains or groats. Dehulling removes about 20% of the whole seed weight. Roller milling, hammer milling, and pin milling of the groats have been explored.

Roller Milling

Roller milling was used to produce a whole grain flour from the canaryseed groats. Use of 100% canaryseed flour resulted in pan bread that was significantly lower in loaf volume than wheat bread. The curst and crumb colour of the canaryseed bread was also different than wheat bread. However, 25% canaryseed flour resulted in comparable loaf volume and crust colour to 100% whole wheat bread.

The groats were tempered to different moisture levels, heat treated at 250°F for 8 minutes, and then fed into a roller mill to produce flakes. Tempering to 14% moisture and a heat treatment prior to roller milling produced intact, high quality flakes.

Yellow Canaryseed Groats

Brown Canaryseed Groats

Yellow Canaryseed Flakes (14% moisture, roller milled)

Brown Canaryseed Flakes (14% moisture, roller milled)

Hammer Milling and Pin Milling

Canaryseed was dehulled and milled to fine and coarse fractions by hammer milling and pin milling without any pre-treatment of the groat. In general, except for water hydration capacity, the pin milled groat flours exhibited higher functionalities compared to hammer milled flours.

Extrusion Opportunities

Canaryseed flours that have been pin milled or hammer milled were used to replace corn flour at 25%, 50%, or 100%. Extrudates containing 100% canaryseed flour exhibited high bulk densities and low expansion indices resulting in dry, crumbly extrudates. Combinations of corn flour and canaryseed flour at 50/50 or 75/25 gave higher quality extrudates.

Canaryseed has been successfully used to make puffs with a formulation of 73% corn flour, 25% canaryseed flour, and 2% pea fibre. These puffs had improved cell structure and mouth feel.

Crisps can be used as breakfast cereals and for inclusion in snack applications such as bars and confectionary. Canaryseed flours at 20-45% inclusion level combined with pea starch concentrates and pea hull fibre produced crisps of the highest quality and appeal.

Canaryseed flours would also be suitable for extruding products that do not require expansions (ie. wavy chips, pasta, compact breakfast cereals such as protein or fibre buds, and crackers). Partially replacing corn or soy flour with canaryseed flour improved nutritional quality while maintaining product characteristics.

Areas for Future Work

Optimization of milling processes is needed to fully understand the impact of milling on functionality of the flour. It has been observed that binding, or plugging, of the hammer mill screens has occurred, likely due to the high oil content of the canaryseed groats. The high fat and oil levels of canaryseed may also lead to rapid rancidity of untreated flours and result in off-flavours. Further work is being conducted to address these issues.

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