Black currant jam

Brochure content:

Agricultural Processing Brochure

South African farmers facing current economic realities are searching for new options to maintain and expand their businesses. One of the many opportunities to grow markets, turnover and profits is to add value to farm produce. Options need to be selected carefully based on sound information and knowledge of the opportunities presenting themselves.

Introduction:

Product group: Black currants

Black currants are from the botanical species Ribes nigrum of the family Saxifragaceae. They are in clusters with every single fruit attached to the main stem.

The black currants have a black skin with a green flesh with the pip enclosed in a fleshy pericarp. The strong flavour and high acidity of the fruit make it unacceptable for fresh consumption. Black currants are mainly processed through pulping, juicing, freezing and cooking.

Product description: Black currant jam

Jam is defined as the product that consists of whole fruit, pieces of fruit or fruit pulp that is cooked with sugar until syrup with the desired solids content is formed. Upon cooling it becomes a soft gel. Black currant jam is produced from fresh or frozen black currants harvested at the mature ripe stage to ensure maximum flavour, colour and pectin development. The freezing of the black currants prior to processing eases the workload on the farm during harvesting season. Once the harvesting season has passed, the frozen currants can be converted into jam at a manageable rate.

Processing of fresh black currants is only practical on a small scale or where the production team and processing team function separately.

Jam is legally required to be:

- smooth or contain tender pieces of fruit, have a colour and flavour typical of the product concerned
- free from defects, insect infestation, foreign or bad tastes or flavours, discoloured particles and peel or skin,
- free from any signs of crystallisation, burnt shreds, grit, foreign matter, and
- Free from pips or seeds, except jam made from fruit which is normally consumed with pips or seeds.

Jam should contain at least 35 parts of whole fruit, pieces of fruit, fruit pulp or fruit puree, excluding sweeteners, with a soluble solids content of at least 60%.
Extra fruit jam should contain at least 45 parts of whole fruit, pieces of fruit, fruit pulp or fruit puree, excluding sweeteners, with a soluble solids content of at least 60%.
Reduced sugar jam should contain at least 35 parts of whole fruit, pieces of fruit, fruit pulp or fruit puree, excluding sweeteners, with a soluble solids content of at least 30% but not more than 55%.

"Black currants jam is produced from fresh or frozen black currants".

Process description:

Harvesting of currants

The firm, ripe currants are picked by hand and placed in flat trays for transport to the processing site. In the past, machine harvested currants could only be used for products where the integrity/shape of the fruit was not of prime importance.

The currants had to be processed as soon as possible after harvesting; otherwise enzyme damage and deterioration occurred. With the improved cultivars that ripen more uniformly and the advanced technology of harvesters, mechanical harvesting has become a viable option for commercial producers.

Cooling and cleaning of currants

The currants must be cooled to between 0 - 5 °C as soon as possible after harvesting and kept at this temperature range until processing starts.

Hydrocooling is the most effective method to achieve rapid cooling. Hydrocooling uses cold water to cool, clean and transport the currants. The trays of freshly harvested currants are dumped gently into a tank containing cold, potable water (0 - 5 °C). The water cushions the currants against possible mechanical damage.

The currants flow via a trough or closed pipe to a vibrating, sloping riddle or screen on which it is sprayed with potable water to complete the cooling and cleaning process. From here the clean currants are delivered to the sorting tables/belts via perforated racks/conveyors that also allow for draining of the cleaning water. The cleaning water may be reused after filtration and treatment.

Although *forced air-cooling* can be used instead of hydrocooling, it requires additional cleaning (aspiration and screening) steps to remove foreign matter. The trays of currants are placed in a chamber where chilled air is drawn into the cold room through the trays. The temperature of the fruit must decrease to between 2 - 4 °C within 1 hour of harvesting.

Washing of currants (optional)

Currants and other berry fruits are not usually washed, unless they contain significant impurities, in which case washing is performed by passing the fruit on belts under low- pressure water sprayers.

Sorting and inspection of currants

This is done to select the best suitable raw materials for manufacturing the value-added end product. The clean currants are spread out on sorting tables and inspected for defects. Any damaged, spoilt or immature currants are removed manually.

Freeze-storing of currants (optional)

The black currants are frozen in the storage containers (straight pack), with or without the addition of sugar. Straight-pack freezing is a slow process and causes the formation of large ice crystals that cause significant damage to the structure and texture of the fruit upon thawing.

Thawing of frozen currants for further processing

The frozen black currants are taken from the freezer and can either be left to reach room temperature naturally or be defrosted in a heat exchanger (sometimes equipped with a chopper) or in microwave equipment.
Currants that have been frozen are easier to process since partial destruction of the cell walls has already taken place by the large ice crystals which were formed during straight-pack freezing.

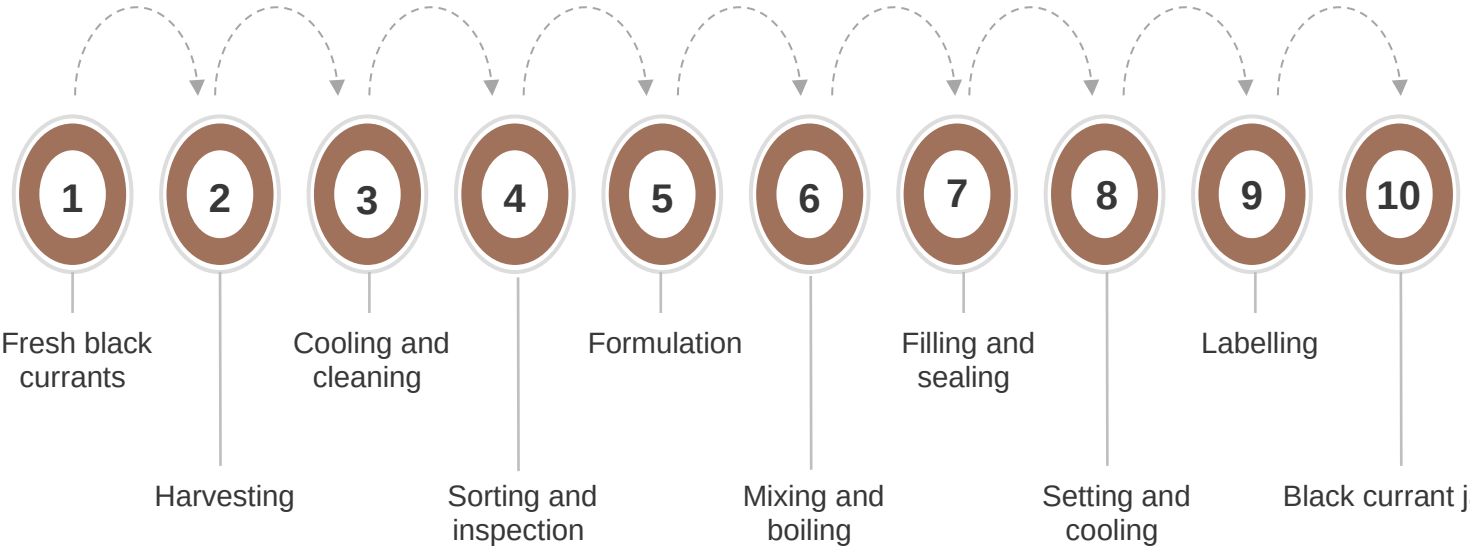
Formulation of black currant jam

Jam is basically manufactured from fruit pieces and sugar. Other optional additions include acids, buffers and gelling agents.

Black currants at the correct stage of maturity contain sufficient acids and pectin to produce a successful jam. But batches of black currants, albeit in the form of fresh or frozen fruit, differ in quality and composition and therefore produce jams of varying quality. These variations in composition and quality of the raw materials can be compensated for by adding calculated amounts of acids, buffers and gelling agents.

For instance, the optimum pH for obtaining the perfect gel is between pH 3,2 and 3,5. The pH of the jam is measured on a 50% aqueous solution of the jam, since the jam does not give an accurate reading. If black currants are not acidic enough, acids in the form of vinegar, lemon juice, lime juice, fumaric acid, citric acid, malic acid, tartaric acid or combinations thereof may be added towards the end of the cooking process. Buffer salts in the form of sodium citrate or carbonate or bicarbonate can be

Process overview



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added to achieve better pH control.

When the fruit does not contain sufficient pectin, as determined by the pectin-alcohol test, commercial pectin can be added. Commercial pectin is available in the form of a powder that requires careful and complete dissolving prior to use. This is achieved by vigorous stirring while adding the powder to water at 80 - 90 °C. For better dispersion the pectin powder can be pre-mixed with 4 -5 parts sugar prior to addition of the warm water.

When preserved fruit is used, the added sugar or other ingredients should be known prior to formulation. For instance, some frozen packs contain considerable amounts of sugar syrup.

The most commonly used sweetener is white sugar in granulated or syrup form (67% aqueous solution). Corn (glucose) syrup may be used to replace a portion of the sugar -0,57 kg corn syrup can replace 0,45 kg sugar. Too much corn syrup can affect the quality of the set and lead to invert sugar crystal formation.

At the correct substitution level, corn syrup has the following advantages:

- prevents sugar crystallisation
- improves texture and enhances smoothness,
- ensures better colour retention during processing, and
- provides a pleasing level of sweetness.

Household recipe books prescribe equal portions (by weight) of fresh, halved fruit and granulated white sugar to be used for black currant jam. This is seldom the case on a large scale, where a finer balance of total solids content, acidity and pectin is required.

The exact quantity of sugar to be added depends on the following:

- the fruit maturity, i.e. natural sugar content,
- the fruit acidity,
- the type of sugar used, and
- the presence of sugar in preserved fruit products

The aim of jam cooking is to achieve a product with 66 - 69% total soluble solids (as determined by a refractometer) and 29% moisture. The sugar content is around 68 - 69% and corresponds with the total soluble solids reading. The exact jam formulation is finally dependent upon trial and error and continuous adjustment.

Mixing and boiling of ingredients for jam

The black currants and sugar is mixed prior to boiling. Other ingredients are added in the prescribed ratios as determined by formulation at the correct stage of cooking. There are basically two methods of preparing jam, namely by atmospheric boiling in open-vat kettles, or by vacuum boiling.

Atmospheric boiling: Steam jacketed batch heaters with a capacity ranging from 75 - 100kg, equipped with stirrers, are used.

Extraction fans are installed directly above the heaters to extract moisture laden vapour. The mixture is slowly heated; taking care to melt all the sugar before boiling point is reached. Boiling continues until the required solids content or required temperature (boiling point) is reached. This is determined by specially fitted electrical thermometers or by taking a sample of the boiling mixture and allowing it to cool. If the sample shows signs of firm gelling, cooking is terminated. With atmospheric boiling the end temperature is between 5 - 9 °C higher than the boiling point of water.

Batch vacuum boiling vessels with capacities of 200 - 500 kg can also be used. The fruit and sugar or corn syrup is added to the vacuum boiler. A pre-heated mixture is pumped into the vessel and the pressure is reduced to ensure that moisture will evaporate at 50 - 60 °C until the required solids content is reached. The pressure is increased to allow the mixture to boil at approximately 90 °C, ensuring the optimum conditions for pectin formation. Pectin and acids are added, if necessary, towards the end of the boiling process.

Filling and sealing of black currant jam

Jam is poured into suitable containers at a temperature of 85 - 95 °C.

This requires boiling jam to be cooled in horizontally stirred mixers fitted with a water jacket prior to filling.

Suitable containers are commonly glass jars with lacquered metal screw-on tops. Glass jars used for the preservation of food should be of high quality, without any cracks or chips and should form tight seals. The bottles require proper cleaning and heating prior to filling to avoid cracking of the bottles (thermal shock) due to the high temperature of the jam.

Rotary fillers or multiple-piston displacement machines capable of filling between 100 and 600 jars per minute are used in large-scale operations. The jars are sealed immediately after filling using a steam-flow machine to ensure that a vacuum forms in the cooled, final product. The container should have a minimum vacuum of 17 kPa and must comply with the requirements as set out in the *regulations relating to the grading, packing and marking of jam, conserves, marmalade and for jelly.*

Setting and cooling of black currant jam

The sealed jars of black currant jam should be handled as little as possible after sealing and left to set and cool.

Excessive handling and shaking injures the gel formation. The cooled jars are ready for labelling

Labelling of fruit preserves

The containers are labelled and coded so that the product contains all the necessary information. Products must be correctly labelled according to the requirements set out in the Labelling and Advertising Regulations.

Legislation involving fruit products

Labelling in South Africa is controlled by legislation. Anyone who wants to use the information provided in this document must familiarise him/herself with all the applicable laws that apply to the producing, processing, manufacturing and storage of the products referred to in this document.

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Other processing options

Listed below are other processing options for black currants not covered in this report, but available from Eskom.

Black currant juice is the crushed and pasteurised liquid derived from fresh or frozen black currants which can be used as a beverage or in sauces, flavourings and fillings.

Carbonated black currant juice: The basic method of manufacture involves preparing the basic black currant juice to which sugar and other permitted ingredients are added to produce syrup which is then diluted with carbonated water.

Canned black currants are prepared from fresh, ripe currants. The currants may either be packed in water or sugar syrup. The water packed product can be used as fruit fillings and toppings. The sugar syrup packed currants can be used as dessert fruit.

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