



Frequently asked questions

Q.1. Differentiate between pulses and legumes?

Ans: Legumes are ripe seeds of the plant family *Leguminosae / Fabaceae*. While the term “pulses” are limited to crops harvested for dry product only, excluding therefore crops harvested green for forage, used for grazing, or as green manure, and also crops harvested green for food (green beans, green peas, etc.).

Q.2. Soaking is an essential method of processing pulses. Justify.

Ans: Soaking of legume seeds in water is used to moisten and soften the seeds to reduce cooking time, aid in seed coat removal and an aid in germination. Soaking reduces the toxin content and surface contamination.

Q.3. Write short note on germination of legumes?

Ans: The germination process involves initially soaking the whole unhusked grains for 12 -24 hours, and then spreading them on a damp cloth for up to 48 hours. Chemical changes occurring in sprouted legumes primarily involve the carbohydrate of the grain, namely the conversion of some starch to lower molecular disaccharides (maltose) and dextrans by the action of amylases. Increases in proteases also occur during germination, causing the degradation of high molecular proteins to lower molecular ones. It has been reported that protein content of raw beans slightly decreases from 28.1 - 26.7% in the germinated beans, the decrease being a result of protein breakdown by the proteolytic action of enzymes (proteases).

Q.4. What are the advantages of microwave cooking over ordinary cooking?

Ans: Microwave cooking is both energy and time saving. The losses in B vitamins and minerals in seeds cooked by microwave are smaller than those cooked by



Q.5. Discuss briefly about roasting of legumes?

Ans: Roasting also known as toasting or parching is a form of preparing legumes. Roasting refers to the method in which usually whole, husked, or unhusked grains are exposed to dry heat. This is performed either directly by placing the whole grains and beans directly upon fire, or more commonly in hot common salt or sand that are in contact with the fire. During this process, the pulse has increased in temperature from an approximate initial 26 °C to 132 °C in a period of 2-3 minutes. The roasted material is separated from the salt/sand by sieving.

Q.6. Write short note on canning of legumes?

Ans: Canning operation involves use of dried whole legume seeds which are then washed in cold water. After draining, the seeds are allowed to soak overnight in water, during which time the moisture content of the dried seeds increases from an initial 10-12% to approximately 20%. This facilitates cooking of the whole seeds, since there is a softening of the seeds. After a weighed amount of beans are put in each can, a liquid is added to the can, this being either a thin sauce (tomato) in the case of navy beans, or water, in the case of peas. The cans are then sealed on a double seamer (sealing machine) and subsequently placed in a retort for cooking. Usually, a 90-minute process is used at a temperature of 135°C (250 F). After retorting, the cans are cooled in cold water for approximately 15 minutes prior to prevent overcooking of the canned product.

Q.7. Discuss milling (dhal making) of legumes?

Ans: Conventional milling of pulsed involves following steps:

Cleaning and grading of pulses: Cleaning of pulses involves removal of foreign material like chaff, sand, stones, mud, ferromagnetic materials etc. from pulse grains.



Pitting. Pitting involves cracking and scratching of clean pulses by passing through emery coated rollers.

Pretreatment with oil: Scratched or pitted material is treated with some edible oil such as linseed oil at the rate of 1.5–2.5 kg/tonne of pulses.

Conditioning: This is done by alternate wetting and drying. About (3–5% water) is added to the pulses after sun drying for a certain period and then tempering is done for about 8 hours. The grain is dried in the sun again. Pulses are finally dried to about 10%–12% moisture content in sun or by mechanical hot-air-drying.

Dehusking and Splitting: Dehusking is a process that removes seed coat/ husk from the whole pulse seeds. It improves appearance, texture, cooking quality, palatability, and digestibility of grains.

Polishing: Polishing is done to provide luster and improve the consumer appeal, and usually a screw conveyor is used for this operation.

Q.8. Write briefly about extrusion of legumes.

Ans: The extruded products are generally blends of cereal and legume flours. It involves the application of both pressure and heat. Products can be extruded at high temperature (140 -200 °C), high pressure (60 -80 bars) with moisture content less than 20 %. The cooking of the products is accomplished in a short time (30 – 60 sec), forced out of the extruder through a variety of dies and dried quickly as it has lower moisture content than conventionally processed products. Besides products produced by extrusion have a light porous texture with high rehydration capacity.

Q.9. What are advantages of fermented legumes?

Ans: The main effect of fermentation is to make more of the grain nutrients available for assimilation in the body, as the digestibility of the legume protein is increased. Digestive enzymes produced by microorganisms during fermentation are able to



break down protein into amino acids and other water-soluble products of protein decomposition. In addition, it has been reported that the fermentation process inactivates unfavourable substances including trypsin inhibitors, haemagglutinins, and saponins that are associated with edible legumes. In addition, fermented products have an increased storage life at room temperature

Q.10. Discuss briefly about fractionation of legumes?

Ans: Recently pulses have been fractionated into starch and proteins by either wet or dry milling. *Dry milling:* In dry milling, pulses are subjected to pin milling twice for obtaining fine grade flour. Although dry processing (air classification) does not result in as pure protein fractions as wet processing, it is an effluent-free process and separated fractions are suitable as food, food ingredient, and other uses. Since some protein bodies still adhere to the starch granules at the end of pin milling, it is necessary to reprocess the coarse fraction by pin milling and air classification for increased protein yield. Washing of the air classified starch has also been suggested to remove adhered protein.

Wet milling: In wet milling whole or decorticates seeds are soaked for 10 - 12 hours in water. The soaked seeds are decorticated and milled along with water to produce loose slurry. The slurry is adjusted to a pH from 8.5- 12 for one hour to remove protein from starch. The slurry is then sieved through sieve of specific mesh. The liquid portion passing through the sieve is subjected to centrifugation at $3000 \times g$ for 10 -15 min. The supernatant obtained is used for recovery of proteins while as the sediment obtained is washed 2-3 times with distilled water and dried at 40-45 °C to recover starch. For recovery of proteins the supernatant is adjusted to a pH of 4.5 and then centrifuged at $8000 - 10000 \times g$ for 10 -15 min. The sediment obtained is collected, adjusted to pH 7 and dried as protein.

Q.11. What are the advantages of dehusking of pulses?



Ans: Dehusking is a process that removes seed coat/ husk from the whole pulse seeds. It improves appearance, texture, cooking quality, palatability, and digestibility of grains.

Q.12. Why pressure cooking of pulses is preferred than ordinary cooking?

Pulses are often cooked in a pressure cooker for faster cooking in order to save time. It involves both high temperature and pressure treatment for a short duration and enhances the digestibility and palatability of legumes considerably. Pre-soaked legumes are subjected to pressure cooking for reducing the processing time and also for obtaining a tender product.

Q.13. Differentiate between roasting and puffing?

Ans: Roasting is either directly by placing the whole grains and beans directly upon fire, or more commonly in hot common salt or sand that are in contact with the fire.

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in puffing grains are soaked in water and mixed with sand, which has been heated to 250°C and then toasted for a short time, approximately 15-25 seconds.

Q.14. What are the changes that occur during cooking of legumes?

Ans: Generally the cooking treatments cause significant decreases in fat, total ash, carbohydrate fractions (decrease in reducing sugars, sucrose, raffinose and stachyose, while verbascose is completely eliminated after cooking treatments), antinutritional factors (trypsin inhibitor, tannins, saponins and phytic acid), minerals and B vitamins. Cooking treatments decrease the concentrations of lysine, tryptophan, total aromatic and sulphur containing amino acids. The losses in B vitamins and minerals in seeds cooked by microwave are smaller than those cooked by boiling and pressure-cooking. In vitro protein digestibility, protein efficiency ratio and essential amino acid index were found to be improved by all cooking treatments.