

Dairy and Food based Instant Dry Mixes: Manufacturing Techniques and Application

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The preservation of food products in its dry form is an old age technique; the low moisture content in the dry product not only lowers the shipping cost and storage space requirement, but also produces a shelf-stable valuable product that can be stored at ambient temperature for extended periods (Kumar *et al.*, 2015). One of the major constraints which restrict the large-scale organized production and marketing of traditional Indian foods are the limited shelf life of the product under both ambient and refrigerated storage (Amadou *et al.*, 2011). Therefore, all stakeholders in this segment have realized the need to develop instant dry mixes of these products. In addition to the substantial value-addition and product diversification achieved by this line of product development, instant dry mixes are also designed to provide convenience to the consumers during its preparation, reduce wastage from spoilage, save consumers time, and reduce financial costs using economics of scale (Saxena, 2018). The manufacturing instant dry mixes requires a delicate balance of technological expertise, food science knowledge, and stringent quality control to deliver consistent and safe products to consumers. The specific manufacturing techniques used can vary based on the type of instant dry mix being produced.

Methods of Production for Instant Dry Mixes

The convenience instant dry mixes available in the market are manufactured by various

techniques such as, dry blending, spray drying, osmotic dehydration, tray drying (with or without vacuum), roller drying, extrusion cooking, and dry-crystallization process (Kulkarni and Reddy, 2007). Several instant mixes of indigenous food products have been described by various authors; some of the products can be directly reconstituted in a suitable medium such as milk or water before their consumption, while some mixes require minimum preparation steps before its ready for consumption.

Dry Blending Process

Dry blending is the one of most widely reported technique for manufacturing of instant dry mixes which involves mixing dry ingredient in standardized/ predetermined proportion to produce a well-mixed dry product. The addition of a small amount of liquid to the mix in the dry blending process has also been reported (Wu *et al.*, 2000). The dry blending process has been reported in a big vat with baffled arrangement for effective mixing of each and every ingredient. The equipment's commercially employed for dry blending purpose are solid blender designs such as ribbon blender, tumbler mixer, etc. The process technology for several dry blended mixes have been reported, including popped weaning food, *kheer* ready mix, *Palada payasam* dry mix, *gulabjamun* mix, instant corn based dairy dessert mix, instant dry peas curry mix, instant mix of *idli* and *dosai poha* mix, *upma* mix, *Rabri* mix, *uttapa* mix and *Gasagasa payasam*.

Dry Blending with Spray Coating Process

A modified method of dry blending, where in the dry blended solid ingredients were coated with a relatively small amount of liquid with techno-functional attributes as a sweetening, colouring, flavouring and seasoning agent has been reported for ready-eat-cereal and dry sugar cocoa-mix. The process is accomplished using specially designed spray gun/ nozzles installed on the top of the mechanical blender. In recent times, rice and millets based instant mixes, roasted nuts, and pharmaceutical drugs have also been manufactured using the spray coating technique.

Extrusion Cooking Process

Extrusion cooking is the HTST process of simultaneous cooking and shaping/ forming of a moistened blend or dough (composed of starch, protein, fat and other ingredients) by a combined mechanism of heating, pressure and mechanical shear (Sahay and Singh, 1996). The extrusion process results in several physico-chemical changes in the food including gelatinization of starch components, glass transition of lactose/ sucrose, denaturation of protein, degradation of anti-nutritional factors, and destruction of microorganism, which impart characteristic textural and flavour attributes, while concurrently improving the overall digestibility and acceptability of product.

Several attempts to manufacture dry mixes using the extrusion cooking technique have been reported in the literature, e.g., RTE snacks, extruded snacks, instant rice porridge, precooked rice granules (extrudate) in instant *kheer* mix, instant vegetable soup mixes, and sorghum cowpea instant porridge.

Spray Drying Process

The spray drying process is a dilute bed drying process based on the principle of atomizing

the feed slurry or liquid, (preferably preheated and concentrated), to form a fine spray of very minute droplets, directed in a drying chamber where they mix intimately with a current of hot air. The large surface area of these mist-like particles results in an almost instantaneous moisture transfer from the particles which is thus dried to a fine powder. Spray drying process has been employed for the preparation of many dry mixes, such as, instant milk-rice powder, *vermicelli* pre-mix, mango milk powder, *basundi* mix powder, *kulfi* mix and *basudi* mix.

Fluidized Bed Drying Process

The fluidized bed drying process is an expanding bed drying process that has been employed in the preparation of instant dry mix, for the production of instant grains from preconditioned soaked grain. The grains are suspended in the hot drying medium (air) stream flowing at a high velocity sufficient to cause the grains to remain in a fluidized state in the dryer. The application of this technique in the process technology of dry mixes includes the preparation of instant rice grain (Jha *et al.*, 2000), instant wheat grains (Shalini, 2005), instant dalia mix (Khan *et al.*, 2014).

Tray Drying Process

Tray drying technique has been reported for the drying of large varieties of solid, semisolid and liquid food products during the preparation of instant dry mixes. Quick-cooking rice in instant *kheer* mix, precooked instant jasmine rice, ready-to-cook instant *kheer* mix have been formulated using a vacuum and/ or atmospheric tray drying process.

Dry-crystallization Process

Dry-crystallization is basically a concentration process recently reported for the preparation of instant dry mixes of dairy desserts such as *payasam*. This process involves the

concentration of solid food ingredient along with milk and sugar till supersaturation stage, and cooling is carried out thereafter, so that the sugar crystallizes over the surface of solid food ingredient. Dry-crystallization has been reported for the preparation of *Palada payasam* dry mix (Unnikrishnan *et al.*, 2003), *Gasagasa payasam* dry mix (Nath *et al.*, 2004) and *Avalakki payasam* dry mix (Nath *et al.*, 2008)

Conclusion

The production of instant dry mixes involves several key steps to create a stable, easy-to-use, and convenient product. The method use for the production of instant mixes affects the overall quality and shelf life of final product. Overall, the production of instant food mixes requires a delicate balance between traditional culinary expertise and modern food processing techniques. It is through this harmonious integration that manufacturers can consistently produce high-quality, safe, and enjoyable instant food mixes that meet the demands of busy consumers seeking convenient and delicious meal solutions. The technology advances in production technique need to be exploited by the scientists and manufacturers for filling the basket of more instant mixes of traditional Indian dairy and food products to meet national and overseas demand of consumers.

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