

## PRACTICE ABSTRACT n° 36

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### Milling (Composite Flour)

Milling is defined as the process of grinding cereal grains or legumes into flour or meal. It is an important and intermediate step in the post-production of cereals. The primary objective of the milling process is to remove the outer layer (husks) and produce an edible portion that is free of impurities and in the form of a powder with different particle sizes. Composite flour is defined as a blend of flours derived from energy-rich cereals, legumes, and oilseeds that are high in protein and fats. This mixture, with or without added sugar, is designed to achieve specific functional characteristics and a balanced nutrient composition. The study focuses on the milling and production of composite flour (Figure 1 and 2).



Figure 1. Composite flour production scheme (left) and flow diagram (right)

### Production of Composite flour

- Raw materials selected for production of composite flour include (white maize, millet, soybeans, biofortified common beans, sesame seeds, and sugar, biofortified beans obtained from the Mvomero Food Hubs).
- Four composite flour formulations were created based on locally available ingredients and WHO/UNICEF guidelines, using Nutrisurvey software to optimize nutrients like protein, fat, fiber, zinc, iron, calcium, and vitamin A (table 1).



Figure 3. Displaced composite flour

Table 1. Nutritional Profile of the three dried vegetables

Formulation	White maize (%)	Millet (%)	Soybean (%)	Biofortified common beans (%)	Sesame seeds (%)	Sugar for taste (%)
1	60	10	10	15	5	3
2	50	15	10	20	5	3
3	52	10	10	25	3	3
4	53	5	7	30	3	3

### Products analysis

- The nutritional composition of a blended composite flour was analyzed to determine key parameters, including moisture content, crude protein, crude fiber, crude fat, and ash content.
- The blended composite flour has a moisture content of 3.99%, which supports its stability and shelf life. With a protein content of 15.22%, fiber at 3.36%, and fat at 3.43%, it offers a balanced nutritional profile.
- The ash content of 2.39% indicates a good level of essential minerals, contributing to the overall nutritional value of the flour.
- The functional properties of the blended composite flour showed moderate water absorption (WAI: 5.20) and low water solubility (WSI: 16.5). The oil absorption index (OAI) was 2.14, with a bulk density of 0.66 g/cm<sup>3</sup> and an angle of repose of 74.2°, indicating a flowable powder with low packing density.
- The blended composite flour is nutrient-dense, rich in beta carotenoids, antioxidants, and essential minerals like copper, zinc, iron, calcium, magnesium, and potassium, offering significant health benefits for functional food development.

The study examines the milling and production of composite flour from local ingredients like maize, millet, and soybeans, optimized for nutrients such as protein, fat, fiber, and vitamins. The flour offers a balanced nutritional profile, rich in minerals, antioxidants, and health-promoting nutrients, making it ideal for functional food development.

