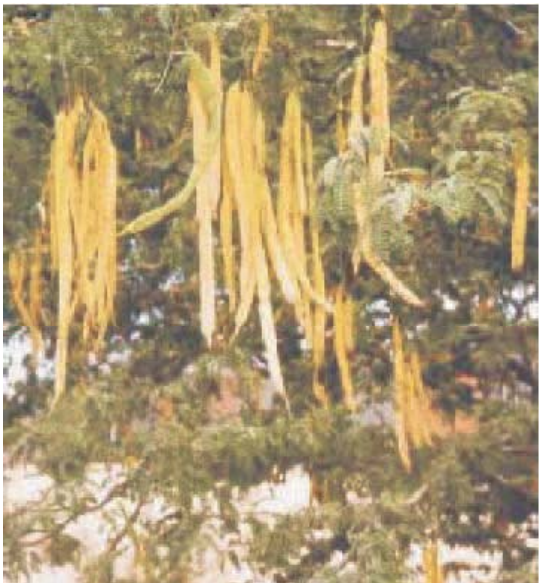
# Cooking with *Prosopis* Flour



## Recipes tried and tested in Baringo District, Kenya

## COOKING WITH *PROSOPIS*

### *Prosopis*: weed or wonder tree?

*Prosopis* are drought-resistant, nitrogen-fixing trees, which are extremely hardy in poor and saline soils, and can grow where most other vegetation fails. The common *Prosopis* species in tropical drylands around the world today is *P. juliflora*, native to Central and South America, but introduced around the world over the past two centuries to reforest barren lands. It has many uses: for livestock fodder, wood for fuel, timber for furniture and building, livestock fencing, charcoal, medicine, pest control, shade, soil stabilisation, soil fertility improvement and human food from the pods and honey from abundant flowers. However, although this tree can offer a crucial contribution to reclaiming desert lands, it has been widely condemned due to its invasive nature. It spreads rapidly by seeds along water courses and across grazing lands, and being thorny and shrubby, can quickly form impenetrable thickets, blocking roads and preventing access to water. This, coupled with the general lack of knowledge on its management and uses where introduced, has meant that up till now it is not used to its full potential in many regions where it is found.

### *Prosopis* as a human food

In their native Americas, *Prosopis* pods have traditionally been used as food. Archaeological finds indicate that they were eaten in the Teotihuacán Valley in Mexico at least 5,000 years ago, and formed an important part of the diet for many Amerindians from present day Argentina to Arizona. The pod flour's sweet, smoky flavour is a valued part of the culinary traditions of many native American groups. Although this flour is available commercially in North and South America, it is only recently being taken up as a food in the regions of the world where it has been introduced. As well as providing a delicious and nutritious food ingredient, an additional benefit of collecting and grinding the pods (including the seeds), is that it helps to stem the spread of the tree where it has become invasive, by reducing the number of seeds being dispersed in the wild. Less common, but no less important, are the African and Asian native *Prosopis* trees, *P. africana* and *P. cineraria*, both of which look very different from American *Prosopis*, but both also have highly nutritious pods widely used and revered by local people.

### The nutritional value of *Prosopis* flour

The amount of nutrition supplied by *Prosopis* pods is quite astounding. They are a rich food source for humans and animals, high in protein, carbohydrates, dietary fibre and sugar. Low in fat and cholesterol, *Prosopis* flour is gluten-free, and an excellent source of calcium, magnesium, potassium, iron and zinc, and amino acids such as lysine that are low in other cereals. Nutritional values are shown in the table below. Medical studies on *Prosopis* pod flour show it to be extremely effective in controlling blood sugar levels in diabetics. The natural sweetness in the pods comes largely from fructose, which the body can process without insulin. *Prosopis* flour requires a longer time to digest then those from most other grains, e.g. 4 to 6 hours compared to 1 to 2 hours for wheat. These factors result in a food that sustains constant blood sugar over time and so prevents hunger. So here is a food that supports the diabetic's diet, and also helps maintain a healthy insulin system in those not affected with blood sugar problems.

| | **Prosopis flour** | **Plain white wheat flour** |
|---|---|---|
| Carbohydrate (g / 100g) | 69.2 | 72.2 |
| Energy (kj / 100g) | 1530 | 1435 |
| Energy (kcal / 100g) | 361 | 338 |
| Fibre (g / 100g) | 47.8 | 3.2 |
| Protein (g / 100g) | 16.2 | 9.4 |
| Total sugars (g / 100g) | 13.0 | 1.5 |
| Fat content (g / 100g) | 2.12 | 1.3 |
| Saturated fatty acids (g / 100g) | 0.6 | 0.2 |

| Amount Per Serving (15 g) | |
|---|---|
| Energy: 54.2 kcal | |
| Total carbohydrates: | 10.4 g |
| Sugar: | 2.0 g |
| Sodium: | 0 mg |
| Fat: | 0.3 g |
| Fibre: | 7.2 g |
| Protein: | 2.4 g |

**Taste and uses**
*Prosopis* flour has a unique taste that has been variously described as; sweet or slightly nutty, with a pleasant hint of molasses or caramel, a sweet chocolate or coffee flavour, with a hint of cinnamon. The flour can be used either in baking or as a spice/seasoning in food and drinks. As flour, it is generally used in combination with other flours, using about 10-25% *Prosopis* pod flour (above 25% the taste becomes too strong for most palates), for example, two tablespoons can be added per 16 tablespoons (8 fl.oz or 240 ml) of other ingredients for a delicious flavour and aroma in all baked goods. As a spice, it can be sprinkled generously on food that is then grilled, fried or boiled. It can also be used for breading meat and fish and is a good flavouring for many dishes. It helps to 'liven up' recipes and can be added to soups, stir-fries, vegetables, scrambled eggs, gravies, puddings, ice cream and just about anything. Some eat it first thing in the morning and find they don't get hungry mid-morning, and adding a tablespoon to a drink will help stave off hunger for about 4 hours. The flour is also a tasty and nutritious addition to gluten-free flour mixes and as an ingredient to balance vegetarian diets.

**Variations in taste**
There are many different species of *Prosopis,* and the pods of some species are sweeter than others, though all are edible. The taste can also vary widely between individual trees of the same species. In terms of spread outside of their native Latin America, *P. juliflora and P. pallida* are most common in tropical regions (e.g. East and West Africa, South Asia), with *P. glandulosa* and *P. velutina* most common in sub-tropical regions (e.g. Australia, South Africa). *P. juliflora* is particularly widespread but generally has a less palatable flavour than these other species. Where the pods are too bitter for a pleasant taste, they can still be used in lower concentrations, with sugar added or just as a livestock feed. If there is any doubt about the species, a specialist from the local forestry department could be consulted, or identification can be made using the field guide "Identifying Tropical *Prosopis* Species" (Pasiecznik *et al.*¸2004). The reference for this guide is given at the end of this booklet and can also be downloaded from the internet.

**Harvesting, drying and storage**
Collect pods directly from the tree if possible, or collect pods that have only recently fallen to the ground. Discard all pods with any blackening or other discolouration, or evidence of browsing, attacks by insects or moulds. Such pods can already be infected with types of fungi called 'mycotoxins' that could cause upset stomachs. Pods need to be well dried before milling, or due to the high sugar content, they will 'stick' or 'gum up' in the machines, and cleaning out such a mess is time-consuming indeed! In Baringo, pods are sun-dried for three days on the ground, though putting pods on a tin-roof or concrete base would reduce possible fungal infections. In other countries they are dried over a fire or charcoal stack, or mixed with embers. Mill immediately, or in the afternoon if sun-drying, as pods can quickly take back in moisture from the air. If pods are to be stored before milling, they should be kept dry (roofed) and without soil contact (off the ground or on a concrete/wood floor), and protected from rodents and other insects that might spoil the crop. Pods can then be stored for at least six months like this, however, they are likely to need drying again before milling.

In summary:
- Harvest only healthy looking pods that have no insect damage
- Dry the pods well before storage or milling (to less than 10% moisture content)
- Store pods and flour in a cool, dry environment
- Prevent insect or rodent damage after harvesting

**Processing**
Dried *Prosopis* pods can be simply pounded in a pestle and mortar, but this produces only a coarse flour and rarely breaks down the seeds. Stone grinding is traditionally used to produce an acceptable flour from the whole pods in Latin America and India. In Kenya, hammer-mills are being used to produce whole pod flour, so also destroying the seeds, making their nutrients available and helping to prevent the further spreading of the species. Pods are sun-dried, broken with a pestle and mortar, and taken to the local 'posho mill' (normally used for grinding maize), or a tracor-mounted hammer mill come to the village on an agreed day and grinds all the pods that have been collected.

**COOKING WITH *PROPOSIS* – recipes from Baringo District, Kenya**

*Prosopis* flour can be used in many different products – virtually anything that uses flour. The following recipes were first tried and tested during a workshop in February 2006 in Baringo, Kenya, facilitated by the Kenya Forestry Research Institute (KEFRI) and the Henry Doubleday Research Association (HDRA) of the UK. They have since been tried again and again during 2006, also in Nairobi and other districts. Try your own recipes and try varying the proportion of *Prosopis* flour!

Abbreviations and measurements
tsp = teaspoon (small spoon) 5ml
tbsp = tablespoon (large spoon), 15ml
1 cup = 16 tablespoons, 240 ml
1 inch - 2.5 cm

**Chapatis**
4 cups wheat flour
1 cup *Prosopis* flour
2 tsp sugar
¼ tsp salt
2 tbsp oil
Water
Mix the dry ingredients in a bowl and add the oil. Add the water slowly and mix to a dough. Cover the bowl and leave for about 1 hour. Form into small balls and roll these out on a clean flat surface. Put a little oil in the frying pan and cook the chapattis on both sides.

**Ugali** (savoury maize cake – a Kenyan staple)
4 cups maize flour
1 cup *Prosopis* flour
10 cups of water
Heat water in a saucepan. Before it reaches boiling point, add a little flour (this stops the mixture 'lumping'). Once the water has boiled, slowly pour in the rest of the flour. Stir continuously and mash any lumps that form. Cook for about 4 minutes and serve with meat and vegetables.

**Uji** (maize flour porridge)
4 cups maize flour
1 cup *Prosopis* flour
Cold water
Hot water
Mix the flour with some cold water to make a thin paste. Add the mixture to simmering water in a pan and stir well until the porridge is cooked. Comments on this dish include: "it tastes like a porridge mix for children", "very sweet".

**Mandazi** (deep fried doughnut-like snacks)
4 cups wheat flour
1 cup *Prosopis* flour
1½ tsp baking powder
4 tsp sugar
1 tsp salt
2 tbsp oil
Water
(Makes around 30 pieces)
Mix the dry ingredients and add the oil. Add the water slowly and mix to a dough. Roll out the mixture to about ½ inch thickness and cut into 1 inch squares. Heat plenty of oil in a pan and deep fry the squares until they puff up and are light and fluffy inside.

**Pancakes**
1 cup wheat flour
1/3 cup *Prosopis* flour
Pinch of salt
tsp of sugar
2 eggs
1½ cups of milk (approx)
Oil for cooking
(Makes around 10 pancakes)
Mix the flour, salt and sugar in a bowl and beat in the eggs. Beat in the milk until the mixture has a smooth texture. Spoon a small quantity into a hot frying pan with a little oil, and cook, turning once. The pancakes are delicious on their own, or with jam, lemon juice or honey.

**Prosopis sponge cake**
1½ cups wheat flour
½ cup *Prosopis* flour
2 tsp baking powder
1½ cups sugar
5 eggs
1 cup softened butter or margarine
Small amount of milk if necessary
Mix the dry ingredients in a bowl. Beat in the eggs. Add the softened butter or margarine and mix well. The mixture should be firm enough to hold its shape, but if it appears too dry add a little milk. Put the mixture in a baking dish and cook at a moderate heat (about gas mark 5) or 30-40 minutes. Check that the cake is cooked through by inserting a clean knife – it should come out clean.
Comments on this cake include: “very tasty”; “a hint of ginger or cinnamon”; “the best”.

**Prosopis pottage**
4 tbsp of wheat flour
1 tbsp (large spoonful) of *Prosopis* flour
1 tbsp butter
1 onion
3-4 cups of hot water (adjust to taste)
Salt and pepper to taste
Parsley to garnish
Fry the onion in the butter. Add the flour mixture and stir. Pour in the hot water a little at a time, stirring well to avoid lumps. Season with salt and pepper. Garnish with parsley.

***Prosopis* ‘tea’**
½ cup *Prosopis* flour
6 cups water
4 cups milk
Bring the water and milk to boil in a pan. Add the *Prosopis* flour and stir well. Simmer for several minutes then serve. This makes a rich, malty-tasting drink.

## References

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## Cover photgraphs

Top left: *Prosopis* pods in tree
Top right: Grinding pods with a pestle and mortar
Bottom left: Baking *Prosopis* cake
Bottom right: Tasting the *Prosopis* recipes in Baringo
Photo credits: Nick Pasiecznik

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