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**HOW TO USE SOYBEANS FROM YOUR GARDEN\***

by

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\*The authors are indebted to Dr. Richard Bradfield,  
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for preparing the section on growing soybeans in the garden.

## INTRODUCTION

Soybeans are very rich in protein, the essential food needed for building muscle, flesh, strength resistance to disease, and health. The soybean generally contains about 2/5 ths of its total weight in protein and therefore is one of the best vegetable sources of protein available to man.

The child who does not receive enough protein will not grow properly. He remains smaller than children receiving enough protein. In addition, he does not have resistance against disease. He is likely to die when childhood diseases infect him. In addition, his brain will not develop properly and he is very likely to remain retarded mentally.

Therefore, it is highly desirable that parents provide their children sufficient protein in their diets. When money is lacking, this can be difficult; but, if the family grows soybeans and knows how to use them, sufficient protein can be provided at a very low cost, and the foods prepared can be very acceptable in taste.

Nutritious products you can make from soybeans include the following:

1. Steamed green soybeans
2. Mature dry soybeans
3. Soybean Milk
4. Tokua - Soybean Curd
5. Taosi
6. Tempeh

## HOW TO GROW SOYBEANS IN THE PHILIPPINES

Soybeans are not difficult to grow in the Philippines. Scientists in the College of Agriculture, U. P. at Los Baños have tested many varieties and have developed some good new ones. The variety Hsih-Hsih from Taiwan does well here. The Harosoy, Amsoy, and Clarke 63 from North America also thrive here. The seed should not be over six months old ordinarily, as seeds older than this do not germinate well and any seedlings obtained are likely to be weak. The seeds should be planted in rows about 1/2 meter apart and from 3 to 5 centimeters apart in the row. They should be covered with 3 to 4 centimeters of soil. Weeds must be controlled by cultivation or hoeing when

needed. The varieties named above can be harvested for eating as a green vegetable in 55 to 60 days. They will require from 75 to 90 days to mature for harvesting as dry beans.

The soybean is a legume and can get most of the nitrogen needed for its growth from the free supply in the air provided it has nodules on its roots. The bacteria which form these nodules are present in many Philippine soils. If they are not present, they can be obtained by getting soil from a field which has recently grown a well-nodulated crop of soybeans. If these sources are not available, special inoculating materials can be obtained from many seed dealers. If your soil is once well-inoculated, it will ordinarily not require reinoculation.

Soybeans require different fertilizers from rice. A fertilizer supply ing about 20 kg of nitrogen, 40 kg of phosphoric acid, and 80 kg of potash pe hectare will be satisfactory on most soils. Many Philippine soils will give a fair crop without inoculation or fertilization.

Soybeans leave the soil in excellent physical condition for growing other crops.

The vines of soybeans are excellent food for livestock if the beans are harvested green.

Unfortunately, many worms find soybean plants very tasty too, particularly a small green army worm which eats all but the veins of the leaves. Pull out and destroy such infested plants as they are centers for spreading the invasion. If possible, spray with a good insecticide. Sevin or Folidol are widely used for this purpose. Insecticides like Endrin, which remain toxic for long periods, should not be used after flowering.

## HOW TO MAKE SOYBEAN MILK AND OTHER NUTRITIOUS SOYBEAN FOODS

### Steamed Green Soybeans

The mature dry soybeans are generally yellow coated beans but there are also soybeans with black hulls. Before the soybeans become mature and dry, they can be harvested as fresh green soybeans. When grown for eating as a green vegetable, the pods should be harvested while they are still green or at most a yellowish green. They should be washed in cold water and then boiled in the pods for 5 to 20 minutes. The more mature the bean is, the longer it should be cooked. Add 1 tablespoon of salt to the 2 liters of water in which the beans are to be cooked. After boiling for 5 minutes the beans are very easily shelled and can then be prepared for the table the same as other shelled beans. They may be combined with sweet corn, carrots, mushrooms, fried rice etc. to make many tasty and nutritious dishes. The pods are inedible

because they are very fibrous. These green beans are a rich source of protein. They taste good. They must be eaten the same day they are cooked unless refrigeration is available to preserve them. They can be boiled and sun-dried and then they will keep.

### The Mature Dry Soybeans

Mature dry soybeans can be hydrated (soaked) until they take up about an equal weight of water and then can be boiled until soft. This may take as long as 6 hours of boiling unless cooked in a pressure cooker, and thus is costly because of fuel consumption. Also many people do not like the flavor. Otherwise, however, the cooked soybeans are very nutritious and are definitely edible.

The problems of flavor and cooking time have resulted in many studies to determine better ways of utilizing the soybeans as food. Among the ways various countries have developed for use of soybeans are soymilk, tokua, taos and tempeh.

### Soybean Milk.

Soybean milk is a water extract of the mature, dry soybean.

The steps in production of soymilk are as follows:

- 1) Sort the soybeans to remove discolored, spoiled, dirty soybeans.
- 2) Wash the soybeans in clean water to remove dirt.
- 3) Soak one evaporated milk can (tall size) of the soybeans (about 300 grams) in 3 cans or 900 ml of clean water 3-4 hours until they have about doubled in size.
- 4) Drain and discard the soak water. You now will have about 2 or 2 1/2 cans of soaked soybeans.
- 5) Grind the soaked soybeans as finely as possible with water. A stone mill (used for grinding rice) can be adapted for the purpose. The hole in the stone mill must be large enough to allow the soaked beans to pass through rather easily. During grinding 7 cans of water are added slowly, a little at a time, along with the soybeans to make grinding easier. Approximately 1 liter of water should be used to grind each 250 grams of soaked soybeans (125 grams dry soybeans).
- 6) The ground soybeans and water, called a slurry, is then filtered through cloth to remove the insoluble residue. The filtered liquid is soybean milk. You will have about 6 cans of soymilk from the one can of starting dry beans.
- 7) The soybean milk is then sweetened by adding sugar to taste. About 3/4 can sugar per 6 cans of soymilk or 3 heaping tablespoons/can (9% sugar) has proved to be very acceptable to Filipino children. Addition of vanilla (0.1%) also will improve the flavor.
- 8) The soybean milk is now heated to boiling and boiled 30 minutes adding water as necessary to replace water lost during boiling to keep the

total volume constant.

9) The soybean milk can now be drunk directly as a proteinrich beverage. One glass (8 ounce) per day will provide a pre-school child with a significant amount of protein. The remainder of his protein requirements may come from dilis (dried fish) and rice. But the glass of soybean milk will add the protein generally lacking in the diet of barrio people. It is also good supplementary beverage for infants, who also require much protein for their rapidly growing bodies.

10) The boiled soybean milk will keep for only one day unless refrigeration is available.

### Tokua - Soybean Curd

After the soybean milk has been filtered to remove the residue, tokua can easily be made. In this case, the sugar and vanilla are not added. Starting with the soybean milk, the following steps are involved:

- 1) Heat the six cans (Approximately 2500 ml) of soymilk to boiling. Remove from stove.
- 2) Add finely ground calcium sulphate (plaster of paris) or magnesium sulphate (epsom salts) to the soybean milk. Add approximately 3 heaping teaspoons (12.5 grams) per 6 cans (2500 ml) of soymilk. Stir very gently to distribute the precipitating agent but avoid breaking the curd into fine particles.
- 3) After the curd has separated as shown by appearance of a clear yellow whey, filter the curd through cloth.
- 4) Press the curd in the cloth in a wooden frame with holes in the bottom to allow excess whey to flow away. Six cans of soymilk will yield about 3/5 kilo to tokua.
- 5) Use the tokua as you would in cooking. Remember that it is perishable and will only keep for about 1 day without refrigeration.

### Taosí

Taosí is a fermented soybean product that requires use of a special mold-Aspergillus oryzae. It requires some technic and care beyond production of soymilk and tokua. The steps in its preparation are as follows:

1. Soak soybeans overnight in water.
2. Boil or steam the soybeans for 1 hour and drain.
3. Cool and coat soybeans with ground toasted wheat or wheat flour.
4. Inoculate beans with spores (seeds) of the mold.
5. Spread beans on a bilao, cover beans with a wilted banana leaf and place in warm place to ferment.
6. When beans are overgrown with the white mold (about 2-3 days), place them in salt brine (130 grams salt/liter of water or 1/4 can (evaporated milk can-tall size) crude salt per can of water), heat to boiling and the taosí is ready to eat. This product will keep.

NOTE: If the mold covered soybeans are placed in the 18% salt brine without cooking, the enzymes in the mold will gradually act on the soybeans producing soy sauce

### Tempeh

Tempeh is an Indonesian food, rich in protein, and useful as meat substitute in soups and as a deep fat fried snack.

The steps in its preparation are as follows:

1. Soak soybeans o
2. Remove the bear  
and floating them off in
3. Add fresh water
4. Drain and cool.
5. Inoculate the beans with a special mold-Rhizopus oligosporus.
6. Wrap the beans inoculated with the mold in wilted banana leaf packets about the size of the hand,
7. Place packets in a warm place to ferment.
8. When the beans are covered with the mold mycelium and form a tight, compact cake the tempeh is ready for cooking. It may be sliced into very thin slices, dipped in salt brine and deep fat fried until crisp or it may be cut into cubes and added to soups. In less than 10 minutes boiling, the tempeh is ready to eat and is an excellent source of protein for you and your children. Fresh tempeh will keep for 1 to 3 days if placed in a cool place. Sun dried it will remain edible for weeks.

\* Sources of soybeans, Chemicals, mold cultures.

- Soybean Seed: try 1) Dept. of Agronomy, U.P.C.A. College, Laguna  
2) Bureau of Plant Industries, Economic Gardens, Los Baños  
3) Seed Supply Houses.

Plaster of Paris ( $\text{CaSO}_4$ )  
and  
Epsom Salts ( $\text{MgSO}_4$ )      Drug Store or Chemical Supply Houses.

Taosi mold (Aspergillus oryzae)

Write Dept. of Ag. Chemistry  
U.P.C.A. College, Laguna  
for suggested sources of mold.

Tempeh mold (Rhizopus Oligosporus)

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