

# PIGEON PEA

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## ECHO TECHNICAL NOTE

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I often tell folks that ECHO specializes in growing food under difficult conditions. The pigeon pea, *Cajanus cajan*, is a prime example of a tough but nutritious plant for just such cases. This article is directed toward two audiences. For some of you, pigeon pea is already an important crop. You will mainly be interested in the information about and seed of vegetable pigeon pea varieties. For others who are not familiar with pigeon pea at all, the general discussion of pigeon pea is for you. (The following information is gleaned from a very helpful book, *Pigeon peas: a Valuable Crop of the Tropics*, by Julia Morton, Roger Smith, A. Lugo-Lopez and R. Abrams, available from Dr. Eduardo Schroder for \$7.00 at Dept. of Agronomy, University of Puerto Rico, Mayaguez, PR 00709-5000, USA.)

### INTRODUCTION

Why might you wish to grow pigeon peas? I think of a number of reasons-

- They grow under poor soil conditions.
- They are tolerant of dry weather.
- They are a nutritious, high-protein pulse crop. There are other reasons too.
- Leaves can be used for animal feed.
- The fast-growing plants make good shade for other crops, e. g. vegetables, herbs, vanilla.
- Plants are perennial for up to 5 years.
- Woody parts can be used for firewood.
- Water and nutrients from deep in the soil can be caught by its deep taproot.
- Plants can be used along contour barriers for erosion control.

The pigeon pea is a shrub that grows from one to a few meters tall and perhaps a couple meters wide, unless special short-season varieties are chosen. Most types flower when the days are 11 to 11 1/2 hours long, but varieties responding to both shorter and longer day lengths are available, and some will flower at any time of the year. Usually flowering begins in 120-150 days and seed maturity in 250 days, but these figures can be as early as 60 and 100 days respectively.

It is often advisable on a small farm to have one area for higher value crops, where the soil has been improved by concentrating the limited amount of manure and mulch, and where perhaps even some irrigation is available. On the remaining, larger part of the farm, plants that yield in less fertile soil and require only normal rainfall are desired. Plants such as cassava, sweet potato and pigeon peas fall into this later category.

A few pigeon peas are also often grown near the house for ease of harvest. For household use "indeterminate" varieties are wanted because they will produce a few pods each day over a long season. I recall visiting a dry part of the Dominican Republic during the dry season. Very little was green in the gardens, but pigeon peas were green and providing a small daily harvest. They do best where annual rainfall ranges from 500-1,500 mm (20-60 inches) a year. The range of suitable elevations depends on latitude. In Venezuela they are grown up to 3,000 meters, in Jamaica up to 1,100 meters. In Hawaii they failed to set seed at 1,000 meters.

"When cultivated for the seeds, pigeon peas are grown as an annual or biennial because the productivity declines after the first year and drops considerably after the third year. When grown for forage or green manure, it is usually maintained no more than five years. The plant will die in about 10-12 years."

"No regrowth occurs when plants are cut off at ground level, but regrowth is satisfactory with cutting heights ranging from 0.15 to 1.5 meters. Vigor declines and plant mortality increases somewhat after a first cutting and more markedly after a second cutting."

"The pigeon pea is noted for greater soil adaptability than other legumes [nitrogen fixing plants]. ... It performs well in a wide range of soil types. It can endure soil salinity of 0.0005 g NaCl/g. It seems well adapted to a soil pH as low as 5 and as high as 8." Plants also are rather resistant to nematodes.

### VEGETABLE PIGEON PEA

(The following is taken from a booklet by the same title by ICRISAT (International Crops Research Institute for the Semi-Arid Tropics, Patancheru, Andhra Pradesh 502 324, India). Pigeon peas are most commonly used as a pulse crop. (Pulses are leguminous crops, the dried seeds of which are used as human food.) When used as a "vegetable," the pea is picked when the seeds have reached physiological maturity, that is, when they are fully grown but just before they lose their green color. At this stage the green seed is more nutritious than the dry seed because it has more protein, sugar and fat." In addition, its protein is more digestible. "There are considerably lower quantities of the sugars that produce gas (flatulence) in the green seeds." The dried seeds contain somewhat more minerals (see Table 1).

Constituent	Green seed	Mature seed
Protein (%)	21.0	18.8
Protein digestibility (%)	66.8	58.5
Trypsin inhibitor (units/mg)	2.8	9.9
Starch (%)	44.8	53.0
Starch digestibility	53.0	36.2
Amylase inhibitor (units/mg)	17.3	26.9
Soluble sugars	5.1	3.1
Flatulence factors (g/100g sol. sugar)	10.3	53.5
Crude fiber (%)	8.2	6.6
Fat (%)	2.3	1.9
Minerals and trace elements (mg/100g)		
Calcium	94.6	120.8
Magnesium	113.7	122.0
Copper	1.4	1.3
Iron	4.6	3.9
Zinc	2.5	2.3

In comparison with green peas, vegetable pigeon pea takes longer to cook and is not as sweet, but is much more nutritious. On a fresh weight basis, it has greater edible portion (72% vs. 53%), more protein, carbohydrates, fiber and fat than green pea. It also has more minerals and much more of some vitamins (469 vs. 83 vitamin A/100g; 0.3 vs. 0.01 vitamin B2; 25 vs. 9 vitamin C).

"The best vegetable pigeon pea cultivars have long pods, with as many as 9 large sweet seeds which are easily removed from the shell." Sweetness is also desirable. In contrast, what is usually sold in Indian markets for use as a vegetable are small pods with small seeds.

"Consumers prefer vegetable pigeon pea with green pods, ... but tests ... have shown that differences in pod color are not related to cooking time, taste or quality." However, cultivars grown from white seeds leave clear rather than colored cooking water.

The large pods are especially attractive to insects. Insect damage can also be greater in cultivars that have the pods clustered in bunches at the tops of the plants, but these varieties are also shorter and are easier to spray with insecticides and easier to harvest.

If the rainy season is long, or the field is irrigated, pods may be produced as long as the plant remains free of disease and the mean temperature remains about 15-30 degrees C. A yield of 11 t/ha of green pods in five pickings was obtained on one plot.

The pods should be harvested just before the seeds start to lose their bright green color. Because pod color at this stage will be different with different varieties, you will need to sample seeds to find when it is best to harvest. In the Caribbean harvesting has been mechanized by adapting green bean pickers.

The ICRISAT book has four interesting and complicated recipes, which, unfortunately, I cannot squeeze into this issue. You can write us for a copy. Readers who do not work in Third World Development Organizations please enclose \$2.50 for copying and postage. (The recipes will, of course, be in the Indian tradition.)

### **SEED AVAILABLE FROM ECHO**

ECHO has seed of both pulse types and leguminous vegetable types. See our seed catalog for additional information.