

## *Sustaining cereal production in the Uplands using pigeon pea*

### ***Pigeon pea: a multi-purpose crop beneficial to farmers***

In a context of prices and climate uncertainty, multi-purpose crops are a true asset for farmers. Pigeon pea (*Cajanus cajan*) is a legume crop that can be used for human and animal consumption, silkworm or stick lack production. It can also be used as shade crop, cover crop or windbreak. After establishment, pigeon pea also improves the soil by its extensive root system, nitrogen fixation by Rhizobium and the mulch provided by the fallen leaves. Pigeon pea can be produced sole, in rotation and/or association with the main cereal crops cultivated in Lao Uplands e.g. rice, maize or job's tear. In 2015, EFICAS project supported the use of pigeon pea in 7 villages.



*Farmer inoculating bio-agent for stick lak production in Houaymoun, Houamuang district @ Chanthavone, 2015*

### ***Pigeon pea establishment and management***

Pigeon pea is an erect short-lived perennial (1-5 years) shrub that can be associated to the main cereal crop (e.g. rice, maize, or job's tear) at cereal sowing or after cereal first weeding (about 15 to 25 days after main crop sowing). Sowing density differs according to the main production objective: from 2-3 kg/ha (planted 2m x2m) for stick lack production to 20-25 kg/ha (planted in high density in inter-row of maize or job'tear crop, 75cm x 40cm) for grain production or soil fertility improvement. Pigeon pea flowering is continuous. Grain harvest starting period varies according to cultivars (early to late maturing varieties), generally from December to April when using Lao or northeastern Thai cultivars.



*Above: Pigeon pea associated with rice in Samsoum, Viengkham district @ Sisavath, 2015*

*Middle: Pigeon pea associated with maize in Poa TSC, Poukhoum district @ Bounma, 2015*

*Right: Pigeon pea flowering @ Mrc, 2009*





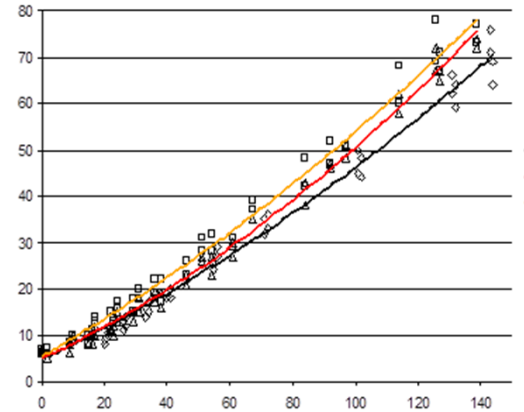
Seeds of pigeon pea  
@ PASS, 2009

In 2015, a total of 320 kg of pigeon pea was provided by the project to the partners farmers for a total cultivated area of about 73 ha.

## Benefits from pigeon pea cultivation

### • Grain production for consumption and/or sale

Grain production varies according to sowing density, pigeon pea management (e.g. number of weeding performed), pest pressure (pigeon pea is sensitive to borers and fruit flies), and harvesting method (multiple harvests following flowering or unique harvest at flowering peak). In northern Uplands, grain production varies therefore from 0.4 to 1.6 T of grain/ha. Pigeon pea seeds have a high nutrition value (24% protein content) and are widely consumed worldwide (notably in India). Pigeon pea can also be integrated in pigs daily intake for fattening activities. Many companies are involved in pigeon pea seeds trading in South East Asia with FOB (free on board) prices ranging from 650 to 750 USD/T on international markets ([www.alibaba.com](http://www.alibaba.com))



Above: Pig growth (kg/days) with (orange and red) or without (black) pigeon pea @ PASS, 2008

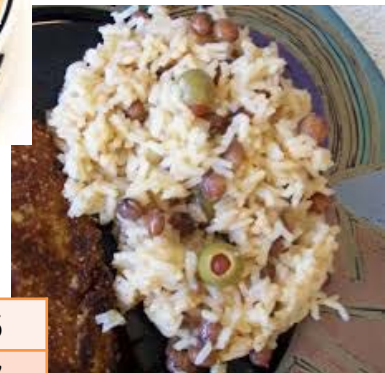
## RECIPE: STEWED PIGEON PEAS

### Ingredients

- 3 cups fresh pigeon peas
- 2 cloves garlic
- 2 pieces salted pigtail
- 1 cup pumpkin chopped
- 1 medium onion, chopped
- 3 chili pepper, chopped
- 3 chicken bouillon cubes
- Vegetable oil, water, soy sauce, salt, black pepper

### Directions

1. Heat oil in large pot.
2. Add the 2 cloves garlic and let burn in the oil.
3. Add the pigtail to the oil, followed by the peas. Stir quickly.
4. Add the pumpkin, peppers, onion, and the bouillon cubes.
5. Cook for approximately 20 - 30 minutes more over medium high heat or until the peas are tender.
6. Taste and adjust seasonings (salt, black pepper).
7. Let simmer for 10 more minutes and then serve.



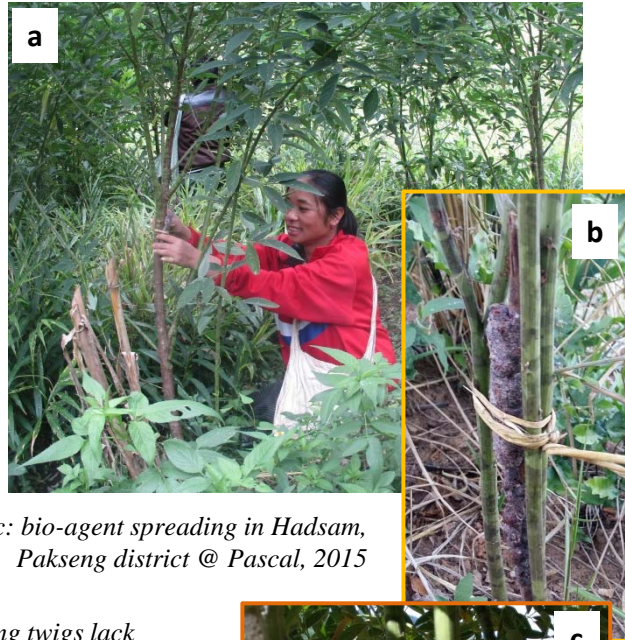
Huge diversity of pigeon pea-based recipe (internet)

East Asia	16
South Asia	77
South East Asia	13

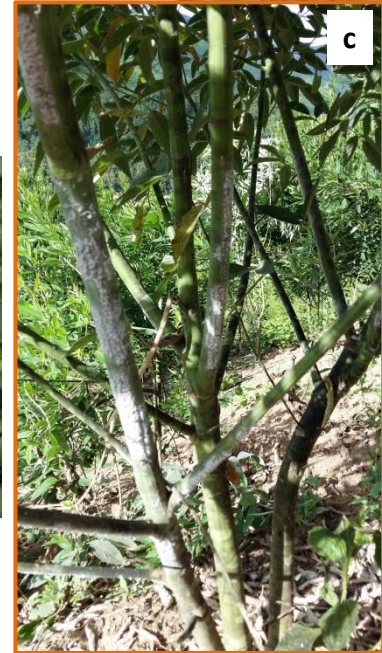
Number of suppliers involved in pigeon pea seeds trading in Asia @ [alibaba.com](http://alibaba.com), 2015



a and b: Stick lack inoculation in Houaymoun, Houamuang district @ Chanthavone, 2015



c: bio-agent spreading in Hadsam, Pakseng district @ Pascal, 2015



### • Stick lack production

Pigeon pea stems can be inoculated for stick lack production (see related technical brief). Stick lack production varies according to sowing density, inoculation methods, external factors (e.g. local climate conditions, animal roaming, pest pressure), and collecting methods. Wet stick lack yields varies therefore from 500 to 4,000 kg/ha with farm gate purchase price varying from 18,000 to 45,000 LAK/kg of dried lack in 2014. In 2015, a total of 30 kg of stick lack inoculant was provided by the project to 3 village communities.

d: stick lack harvest; e: removing twigs lack f: dried stick lack; g: stick lack leaves @ Souklaty Sisaneth, 2007



Below: stick lack production calendar

Activities / Period	Dry season						Wet season					
	O	N	D	J	F	M	A	M	J	J	A	S
Planting pigeon pea												
Brood lac inoculation												
Stick lac harvesting												
Upland rice production	Harvesting			Land prepa.			Planting		Weeding			

### • Soil fertility improvement

Pigeon pea improves the soil by its extensive root system, nitrogen fixation by Rhizobium (40 to 90 kg of N ha<sup>-1</sup> year<sup>-1</sup> that can benefit the cereal planted next) and the mulch provided by the fallen leaves.

Mulch related to pigeon pea leaves fall @ PASS, 2009





## Main constraints to adoption and possible pathways to overcome them



### • Pigeon pea limited use in human consumption

Despite valuable nutrient properties and taste, pigeon pea consumption is limited in Lao PDR. Projects involved in pigeon pea promotion must highlight (and support) the multi and versatile use of pigeon pea (seeds production for human consumption or for sale, stick lack production). Pigeon pea consumption could be promoted in improved nutrition program through e.g. pigeon pea-based recipe tasting, local recipe contest etc.

### • Market opportunities, price and volume volatility

Market for pigeon pea seeds in Lao PDR is still limited due to a lack of connections with the suppliers involved in pigeon pea trading at regional level. The demand and price for stick lack are also highly variable from one year to another one. Projects involved in pigeon pea promotion should support farmers technically (cropping itinerary, stick lack bio-agent i.e. insect maintenance), facilitate market development (seeds, stick lack) by identifying regional and local traders, involving local extension agencies and technical service centers.

### • Pest pressure

Pigeon pea is sensitive to pod borers, and fruit flies. Stick lack is sensitive to ants, stink bugs and stem borers. Integrated pest management (IPM) approaches, including the use of natural repellent and bio-insecticides have to be associated to pigeon pea cultivation to insure adequate grain and lack yields.

### • Animal free roaming

Communal grazing after crops harvest is a widespread traditional territory management rule in Lao PDR. Animals are posted far from cultivated areas during the cropping season and brought back after main crops harvest, threatening relay crops economic and environmental profitability (e.g. pigeon pea seeds and stick lack production losses). Engaging the whole village community in defining new agreements regarding grazing period and areas, and/or reinforcing local by-laws on cattle roaming are necessary to facilitate the integration of pigeon pea into upland farming systems.

Constraints	Wet season					Dry season					Types of damage			
	A	M	J	J	A	S	O	N	D	J	F	M	Host trees	Lac insects
Grasshoppers													Young plants	
Ants														Lac insects
Rodents													Stems & roots	Brood lac
Stink bugs													Stems	
Stem borers													Stems	
Weather													Kill hosts & Lac insects	
Pigeon pea death													Death after inoculation	
Theft													Brood lac & stick lac	

Main constraints related to stick lack production; adapted from Souklaty Sisaneth, 2007



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