

## First Report on the Incidence of Plant Parasitic Nematodes on Adzuki Bean from India

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### ABSTRACT

A survey was undertaken in the main farm of the institute to know the incidence of plant parasitic nematodes on exotic germplasm lines and varieties of Adzuki bean. For the first time incidence of *Heterodera cajani* Koshy Swarup and Sethi *Rotylenchulus reniformis* Linford and Oliveira was reported from the roots and rhizosphere of Adzuki bean, *Phaseolus angularis* (Willd)W. Wight from India. Beside this *Hoplolaimus indicus*, *Helicotylenchus dihystra* (Cobb) Sher, *Tylenchorhynchus mashoodi* Siddiqui and Basir, *Boleodorus* Thorne *Aphelenchus* Bastian *Aphelenchoides* Fischer and *Xiphinema* Cobb were also recovered from the rhizosphere of Adzuki bean. The highest population of *R.reniformis* was recovered while lowest was *Aphelenchoides* sp. and *Xiphinema* sp. Highest frequency of *H.indicus* was encountered in the rhizosphere of Adzuki bean grown in Kanpur.

**Key words :** *Heterodera cajani*, Adzuki bean, survey, *Rotylenchulus reniformis*, nematodes

Adzuki bean, *Phaseolus angularis* (Willd)W.Wight known also Azuki bean its major producers are China (670000 ha) Japan (600000 ha, produce 100,000 t/year), south Korea (25000 ha), Taiwan (15000 ha) and used seed and the seed flour are important trade in oriental market. The dried seeds of Adzuki bean are eaten, either cooked whole or made into flour for use in soups, cakes, confectionary and icecreams. Adzuki beans are particularly popular in China, Taiwan, Korea and Japan where red seeds have a cultural value related to birth, wedding and death. Immature seeds and sprouted seeds are eaten as a vegetable. Adzuki bean also grown for forage, as green manure and for soil coverage.

Mature raw Adzuki seeds contain per 100 g edible portion: water 13.4 g, energy 1377kj(329kcal), 19.9 g Protein, Dietary fibre 12.7g, Iron 5mg, Zinc 5mg, Vitamin A 17IU, Vitamin B6 0.35mg per 100 g. Adzuki bean perform best in subtropical and warm temperature climate. Irrigation of adzuki bean is not normally done. In China it is often intercropped with maize, sorghum and millet. It is annual, usually bushy and erect herb upto 90 cm tall. Numerous cultivars have been recorded with in *Vigna angularis*, differing in time to maturity, seed colour and plant habit intermediate types between wild and cultivated plants, called weedy types have been found in Japan

Numerous fungi and bacteria are known to cause

diseases in Adzuki bean including powdery mildew, brown stem rot, bacterial blight, several insect pest such as *Sporodoptra tura*, Adzuki pod worm *Matsumuraeses phaseoli* Japanese butterbur borer (*Ostrinia scopolalis pacifica*), There was no incidence of nematodes reported from India, hence a survey was carried out in Kanpur where exotic germplasm and varieties of Adzuki bean was sown for experimental purpose, to know the status of nematode incidence if any to this crop.

### MATERIALS AND METHODS

Some of the germplasm and varieties of exotic Adzuki bean were sown in Indian Institute of Pulses Research main farm, Kanpur, plants showing wilting, stunting and yellowing of leaves. Soil samples were collected randomly around the rhizosphere of Adzuki bean plants. Twenty five samples were collected 15-20 cm deep with 20 cm long soil sampler. Each soil sample consisted of 5-10 soil cores while root samples consisted of 10-15 g of randomly selected roots. In the laboratory, nematodes were extracted from 250cm<sup>3</sup> soil samples by sieving and decanting method and modified Bearmanns Funnel method, cysts were collected from soil and roots on a 180 µm pore (80 mesh) sieve. The cyst of *Heterodera* sp. were hand picked and eggs and juveniles in the cyst were counted. The nematode population were assessed using a binocular microscope.

### RESULTS AND DISCUSSION

Species of nematodes were found from the rhizosphere of Adzuki bean were *Heterodera cajani*, Koshy, Swarup and Sethi *Rotylenchulus reniformis*, Linford and Oliveira, *Hoplolaimus indicus*, *Helicotylenchus* (Cobb) Sher, *Tylenchorhynchus mashoodi*, Siddiqui and Basir, *Boleodorus* Thorne, *Aphelenchus*, Bastian *Aphelenchoides*. Fischer and *Xiphinema* sp. Cobb in varying densities and frequencies (Table1).

From root system of Adzuki bean 11-15 viable cysts of *H.cajani* containing eggs have been found attached which were picked by hand under steario microscope while average 210 juveniles from rhizosphere soil were extracted. Pathogenecity test in the cage house showed that Adzuki bean is a good host of pigeonpea cyst nematode, *H.cajani*. In Japan Soybean cyst nematode, *Heterodera glycine* considered as a potential pest of Adzuki bean (Sugawara, 1997).

**Table 1. Plant parasitic nematodes associated with Adzuki bean. (Average population per g of root and 250 cm<sup>3</sup> of soil)**

Nematode	Average population	Per cent frequency
<i>Heterodera cajani</i>	210 (5-11 cyst)	23
<i>Rotylenchulus reniformis</i>	320	50
<i>Hoplolaimus indicus</i>	25	100
<i>Helicotylenchus dihystra</i>	15	50
<i>Tylenchorhynchus mashoodi</i>	2	12
<i>Boleodorus</i> sp.	31	25
<i>Aphelenchus</i> sp.	6	25
<i>Aphelenchoides</i> sp.	2	12
<i>Xiphinema</i> sp.	3	12

Reniform nematode, *R. reniformis* infestation on Adzuki bean was greater than pigeonpea cyst nematode in population density as well as in frequency (Table1). Pigeonpea cyst nematode, *H. cajani* and reniform nematode, *R. reniformis* infestation on adzuki bean are reported for the first time from India.

The highest frequency of *Hoplolaimus indicus* followed by *Helicotylenchus dihystra* indicated the high ectoparasitic nematode activity on the root system of Adzuki bean plants followed by *Aphelenchus* sp. and *Xiphinema* sp. Presence of *Xiphinema* sp. suggests to find out its role in transmission of virus to this crop, as Adzuki bean is highly suitable crop for the subtropics and the high altitude tropics. The potential of Adzuki bean as an antierosion crop not to be overlooked either, further research is needed to know the yield losses causes due to cyst and reniform nematodes as well as ectoparasitic nematodes, especially *Xiphinema* sp.

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#### LITERATURE CITED

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