GLOBAL PLANT CLINIC

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Getting Better all the Time

Farmers and Plant Doctors talk about their work and plant health problems in Bangladesh

Paula Kelly

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ফসলের ডাক্তার

PLANT DOCTOR

Global Plant Clinic

The GLOBAL PLANT CLINIC (GPC) is managed by CABI in alliance with Rothamsted Research and the Central Science Laboratory. The GPC provides plant health services and supports over 65 plant health clinics in Africa, Asia and Latin America. Our diagnostic service, which covers all plants and types of problems, is used by over 80 countries and helps maintain disease vigilance. We link extension and research, train plant doctors and scientists, and work with all sectors to improve regular and reliable access to technical support and advice. Our aim is to create durable plant health services for those who need them most. Visit www.globalplantclinic.org or email plantclinic@cabi.org for details

Rural Development Academy, Bogra

RDA was established in June 1974 as a specialized national institution for training and action research related to rural development. It is an autonomous institution governed by a Board of Governors and attached to the Ministry of Local Government, Rural Development and co-operatives. RDA trained locally elected women officials to be plant doctors who now run regular clinics in Bogra. Email A.K.A Zakaria on rda_bg2003@yahoo.com

Agricultural Advisory Services, Dhaka

AAS is a leading national agricultural orientated NGO, well connected with rural communities throughout Bangladesh. AAS's agricultural programmes specialise in working with resource poor communities, although they have many other programmes including healthcare, water and sanitation, and non-formal education. AAS work closely with service providers in the local community to run mobile and fixed clinics in and around the Natore district. Email *MD.* Harun-Ar-Rashid on aas@bdcom.com

Shushilan

Shushilan means 'good practice' and is the name of an NGO in the far southwest of Bangladesh near to the Sundarbans. Shushilan's main objectives are promoting ecological sustainability and secure livelihoods for disadvantaged people in the southwest coastal region. They have been involved with agricultural programmes and extension since 2000. Shushilan joined the programme in 2005 and have recently set up clinics providing information and assistance for farmers and aquaculturists in Satkhira *Email* Mostafa Nuruzzaman on shushilan@shushilan.org

Additional editing by Eric Boa and Jeffery Bentley

PLANT HEALTH CLINICS, BANGLADESH

SUMMARY

Farmers all have a story to tell to the plant doctors of Bangladesh. Plant doctors have their own stories too. They find plant health problems they have never seen before, learn new things from listening to farmers and are proud to provide a service for their community.

Paula Kelly visited the clinic in Radhanagar in Bogra and interviewed Anjara, the plant doctor, and found out how she enjoyed her new job, and what it meant to the community to have a plant clinic.

At the plant clinics in Natore Paula watched a Going Public event on brinjal (eggplant) pests in Jonail and met the new AAS pathologist Asmara Begum who gave some good advice on bean anthracnose at a mobile clinic in Gobalpur. Paula also rediscovered a leaf miner problem in lychee in Tirail, couldn't solve a banana problem for the farmers of Percole clinic (but took samples) and met Atik Sumon, a twelve year old boy, who brought in jujube fruit for his dad who was working in the field.

Stories from Bangladesh

PUBLICITY AND ARTICLES

The following publications from Bangladesh are available from the Global Plant Clinic, contact plantclinic@cabi.org to request your copy.

Bentley J,. Nash P. (2003) *Field Methods for learning local knowledge of pests and disease*

Bentley J, Nash P. (2004) *Plant Health Services for Family Farms: Bangladesh*

Bentley J, Nash P. (2005) *Plant Doctors Get Going*

Kelly P, Sterry L (2007) *Bangladesh's plant doctors* in *CABI in Review 2006* www.cabi.org/files/Annual%20Review

Kelly P. (2006) *Healthy plants for Bangladesh* Photo report

Kelly P, Waller J. (2006) *Motorcycle Diaries and Barefoot Doctors*

Nash P, Bentley J. (2003) *A look at Local Knowledge of Pests and Diseases in Bangladesh*

Nash P. (2006). *Bangladesh: the Female Touch Cures Sick Plants* in DFID 2005 Annual Report (ed) E. Boa

Nash P, Bentley J. (2004) *Mobile Clinics & Local Knowledge in Bangladesh*

Nash P, Jones P. (2006) *I need a doctor. Plant health camps and plant doctors*

Nash P, Van Mele P. (2005). *Going public: A quick way to interact with communities.* In: Van Mele P, Salahuddin A, Magor NP. (Eds), *Innovations in rural extension: case studies from Bangladesh,* CABI Publishing, Wallingford, UK, pp. 320

Rashid H, Rahman M, Nash P, Bentley J. (2006) *Local Knowledge of Plant Health in Bangladesh. The meanings of names farmers use for pests and diseases and how they control them*

Zakaria, AKA Haque, B. (2003) *Report on Plant Hospitals in Bangladesh*

We are pleased to announce that a DVD of the plant clinics in Bangladesh is about to be released. Contact the Global Plant Clinic for a copy.

Plant Healthcare for Poor Farmers: An Introduction to the Work of the Global Plant Clinic can found at www.apsnet.org/online/feature/clinic. Other reports and articles about plant clinics around the world are posted on the research for development portal www.research4development.info.

Always on time, always ready to help

ANJARA HAS BEEN TRAINING as a plant doctor for four years and runs the rural plant clinic like clockwork at Radhanagar village every Tuesday. This year there have been several changes. New signs directing people to the clinic have been placed in the popular daily marketplace and notice boards filled with colourful leaflets advise farmers of upcoming events and potential plant problems. Approved pesticide dealers in the village also have newly painted signs above their shops.

A large wicker and bamboo hut, specially built for the plant clinic, is a shady waiting room for farmers, who can sit on the new benches painted 'first aid' green. Anjara paid for one of the benches herself through donations given to her by farmers, grateful for the advice she has given them. Although the service is free for farmers, Anjara has begun to receive gifts, sometimes a bag of produce and sometimes one or two taka (about USD $0.015 to $0.03) from grateful farmers.

Anjara herself has changed. She is more confident in her abilities as a plant doctor, and is respected by the farming community. She is popular because she helps farmers on the spot so they can make informed decisions about controlling pests. She has learned many things as a village plant doctor, through intensive training from RDA, her own perseverance and through frequent visits to the field. Anjara tells me 'This is a valued and new service in this village, and farmers know who I am now. Animal and human doctors are an old idea, but farmers have never had plant doctors before. I

like this new idea and farmers do too. I like going to the field in the green apron and being recognised as the plant doctor. Many foreigners are coming here too now, which has been a big change for the village'.

Anjara is an elected municipal official, and serving as plant doctor is only one of her duties, which also include organising road construction, issuing birth certificates and food relief and monitoring projects. Anjara is only meant to run the clinic one day a week. She has found that it does take up a lot of time, as farmers continually seek advice from her, but she is happy to help, and thinks that her popularity as a plant doctor may help win her re-election on the municipal council in January.

Even if she is not re-elected she is sure farmers will still come to her for advice. Mahmuda, who joined as a clinic sister in March helps out at the clinic. She had been coming to the clinic for several months, and liked seeing the effect it had on the villagers. 'Farmers seem happy with the clinics and after observing the service a few times, my interest grew and I wanted to join'.

Mamhuda is eager to share her experiences at last week's clinic and starts to describe a problem in tomato. Anjara helps out, and accurately recounts the disease symptoms which farmers called *bhairash* (from the English word for 'virus', although the problem may not necessarily be caused by a virus). Most farmers bring samples to the clinic, although on occasions when they don't, Anjara follows up with a field visit to see the problem for herself

Anjara sees that there is a future career in being a plant doctor, even if she isn't re-elected

and collect samples for RDA's agronomist Babu Haque to analyse.

The local DAE advisor also assists on clinic days, and Anjara and Mamhuda have learned much from his many years of experience. Anjara is still keen to learn more and tells us that going to London for special training would help her become a better plant doctor.

Her ambition is to become independent of RDA, adding "Training and knowledge are very important." She is also good at asking farmers the right questions and listening to what they have to say, which has helped a good plant doctor become even better.

And in the third year Ashraf's bananas became sick

A NEW BANANA DISEASE is puzzling both AAS plant doctors and farmers in the Percole bazaar plant clinic. Ashraf Abul has been growing bananas for three years, and within the last year some of his banana plants aren't producing fruits, and the ones that are, are diseased.

He brought a bunch of fruits (*kandi*) into the clinic. They were all small, transversally cracked and scared with raised tar-like, gummy lesions browning at the tips. Around 50 out of his 700 plants were affected, although Asraf is worried that it may get worse.

A visit was recommended so that plant doctors Paula Kelly and Harun-ar-Rashid (director of AAS) could see for themselves the symptoms in the field. In some plants, Ashraf tells us, the problem starts after flowering, when the bananas have formed. But in most cases, when trees are around 8 months old, Ashraf notices the top leaf starting to die and become dried, and other leaves dying too. The trees also lacking a growing leaf tip. To prove his point

Ashraf cuts down a banana plant with dried outer leaves, and shows us a small dark hole where the central emerging leaf should be. He starts to slice the stalk from the tip downwards. There is a superficial dark purple stain. As Asraf unfurls the outer layers of the plant he reveals more of the dark purple discolouration in the inner pseudostem.

Ashraf is worried he wfon't have any harvestable banana due to this problem with his banana trees

He continues slicing from the top down until we see a distinct clean junction of healthy and diseased tissue. The tree was a good sample as it had just recently died; it is important to go to the field to select samples for sending to the laboratory for analysis. The staining was limited to the inner part, and didn't extend to the outer trunk or vascular region, which would indicate a Fusarium wilt.

We collected samples of banana pseudostem (the 'trunk') and carefully wrapped them in banana leaves to keep them fresh. There were no obvious galleries indicating banana weevil damage, but another banana producer pointed out a larva wriggling in a droplet of water near the top of the cut in the tissue, although this is probably an opportunistic pest. However, as no-one was equipped for taking insect samples it was impossible to collect. The plant clinics should have basic equipment for collecting samples.

We do not know yet what is causing the disease and indeed, if the fruit and tree symptoms relate to the same causal agent. Taking samples is a good place to start, and may be the clue to finding answers for the farmers of the region. Mojibur Rahman also brought a diseased tree with similar symptoms into the plant clinic at Tirail. Mojibur calls this *bharis* and sprays insecticide. All farmers at Tirail say they have a lot of disease in their fields and in the worst cases say it affects one in every 8 trees. Farmers here also report that these trees don't produce fruits.

The new plant doctor and the beans with holes

A mobile plant clinic was held in Sayedpur, Rajendrapur Union on the 25 November 2007 from 3-5 PM on plant health problems affecting country bean. Asmara Begum, plant doctor of AAS, discussed anthracnose with interested farmers, and a visiting scientist from the Bangladesh Agricultural Research Institute spoke about the bean and fruit borer.

Asmara suggested that the farmer should clear the field of weeds and dead leaves and collect and destroy the affected part of the plant as measures to control against anthracnose. As a last resort, farmers were advised to spray with Tilt, Bevistin, Dithan M-45 or Knowin at a rate of 10 ml in 10 litres of water.

It was suggested that farmers should use insecticides of the kartap group to control fruit borer, before the beans are in flower, or use Relothrin, if flowers have already formed. Farmers were encouraged that the best method of control is to hand pick bean flowers with small beans attached. This is because the insect is attracted to the tender new growth. Asmara wrote prescriptions for 9 farmers out of the 30 that attended the session.

A focus group discussion was arranged on bean fruit borer with concerned farmers. Farmers told Harun that they had started bean cultivation in 1990, although began to scale production in 2000. They used 24 types of insecticide namely, Kartap, Ointap, Fenfen, Sumi Alpha, Regent, Syrine, Sunisydene, Cup, Fedy, Motar, Fytar, Mintap, Fini, Darsban, Tufgar, Fensid, Phentox, Lebacid, Chlorocid, Dimecron, Vitacil, Ten Up, Seetap, and Fardan.

Farmers gave three reasons for using various different kinds of insecticides. First, on the recommendation from other farmers, second, on the advice of the dealers, who suggested that farmers mix one insecticide with another and third on the recommendation of field workers. Farmers believed that out of the 24 insecticides they used, the most effective were Kartap, Somi alfa, and Syvine. Most of the farmers agreed that many of the insecticides don't work. They used insecticides over 100 times throughout bean cultivation.

Even though farmers knew of the damaging effects to plants through excess dosage; loss of leaves, death of some plants, and flower drop for example, farmers are still reluctant to use correct dosages and frequency of application. Farmers also knew that the insecticides sometimes caused the sprayer to become ill, however they strongly believe that there are were no such detrimental effects for consumers.

Some innovative methods such as handpicking flowers with small bean and removing infested stems were practiced by farmers. Farmers were also urged to rotate the insecticides that they use, because insects build resistance when continued use of the same insecticide is practiced. Hand picking was promoted as the best method for control. At 5.00 we finished the programme and returned to the AAS office.

Story by Asmara Begum
Plant Doctor, AAS

Splitting lychee divides opinion

Abdul Latif has been growing lychee for several years. This year he is concerned because he has seen something unusual happening to the leaves. The midrib on some of the younger leaves turn brown, splits from the tip, and the leaves sometimes curl. It worried Abdul so much that he brought samples to show the plant doctors at the Tirail clinic to see if they could help.

The recently qualified BARI scientist has a PhD in entomology and helps out at the clinics whenever he can. He observed larvae of the lychee leaf-curling insect and attributed the main symptoms to this insect, although Paula Kelly was convinced that this was the same as she had observed a year previously, and consulted her report.

Paula quickly found her notes on the computer she brought to the field with her, which read; '[CABI plant pathologist] Jim [Waller] hadn't seen this type of damage on lychee before. The lychee leaf was split along the central mid rib and on closer examination with a x10 hand lens, Jim saw that the narrow midrib channel had been hollowed out causing the split. The symptoms and the fras were highly suggestive of leaf miner damage.'

Looking at the leaves that Abdul brought into the clinic more closely it was clear that they had leaf-miner symptoms. Paula was able to

identify the problem because she had observed these symptoms before, in the field, with an experienced expert.

As this is a new problem, we decided to go to the field to collect samples and see if we could observe leaf miners inside their galleries. We didn't have any equipment to collect samples, but the local people swiftly located a paper bag, which suited the purpose. Abdul's fruit orchard, just a short walk from the clinic, had about 30 trees that were about 4-5 years old. The first tree we looked at had new leaves which were already splitting.

The trick for observing leaf minors in their galleries is to hold the leaf up to the light. We couldn't see any, even though the damage looked fresh. We concluded that either they had already left the leaf, or that they were too tiny to see.

We collected some leaves hoping that some insects would be in the samples. BARI has facilities to rear insect larvae to adults, useful for identifying future cases, although it may be difficult to provide timely answers this time.

And the farmer only wants to know what to do now. To limit the spread, we recommended that Abdul remove and burn the leaves showing symptoms. The scientific name of the insect could wait.

Zakaria of RDA has also noticed leaf miner damage for the first time on lychees growing on the campus. He is sure that the leaf miner comes from the citrus trees that are grown in the same orchard, and the lychee is a new host.

The adult of the citrus leaf miner (*Phyllocnistis citrella*) is a white moth only 2 mm long. When at rest, it seems to be facing backwards, due to black and brown lines with a black spot on the tip of its wings. Larvae are translucent greenish-yellow and 3 mm long when fully fed (Crop Protection Compendium, 2006). The citrus leaf miner causes severe damage as it reduces the photosynthetic ability of the trees.

[Above] The prominent clinic sign advertises the service at Tirail so that farmers like Abdul have access to a permanent plant health service in their village

My father sent me to the plant clinic to get help

'What is wrong with my jujube fruits?' asks 12-year-old Atik Shaharrian Sumon who has brought in fruit samples from his village in Champta. His dad is busy working in the field today. It is Tuesday morning around 10 O'clock and the plant clinic in Jonail has already been open for business since 9.30 AM.

Atik has patiently waited for four other farmers ahead of him to discuss the problems with their crops. He waits until we have spoken about leaf-feeding insects on blackberry, a virus in papaya, a leaf miner problem in lychee, and chilli samples with small curled leaves.

Atik holds a long jujube tree branch, and a plastic bag, which he carefully opens to

reveal small, dieing fruits, which have 'dropped off the tree before their time'. He says that the problem starts just after flowering, when the green fruits start to rot. 'There isn't anything wrong with the flower' Atik says.

We ask Atik to show us where on the fruit the problem starts. Atik picks up the fruit and points to the base of the fruit, where it is attached to the stem, then moves his finger to the end of the fruit, indicating disease progression. He gives a shy smile and waits again, but this time for an answer.

Now it is our turn to be quiet. We don't know what is affecting the fruits. Like detectives, we start to eliminate suspects one by one. There is no sign of insect damage and no symptoms of virus or phytoplasmas.

The most likely causes are fungi or bacteria, or natural shedding. Fruit trees such as jujube have a limited capacity to absorb nutrition and can only bear so many fruits to maturity. Pathogens are not always the cause of problems, when natural causes include shedding or ageing.

We collected samples for diagnosis to investigate the problem further and will check with literature sources on jujube (*Ziziphus jujube*) to learn more.

As it was dark in the office, Paula Kelly asked Atik if he would pose for a photograph. Atik gave a big smile and rushed outside proudly showing his samples.

[Above] Lots of people attend clinic sessions, but many come after hours for advice. They are referred to other clinics, however, there should be a more formalised system of who to contact during these times

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Eleven steps to plant health in Natore

It was business, but not quite as usual at the Percole Bazaar, plant clinic No. 11. Sidur Rahman, the designated plant doctor, is an agrochemical dealer. He usually runs Sunday clinics but today he was busy with official government duties. National shortages and high demands for fertilizer have meant that Sidur has to officially distribute the fertilisers to farmers who are often frustrated and angry about the lack of resources. Sidur's younger brother, Md Hashuue, welcomed the visiting plant doctors from AAS and opened the clinic for business.

About 15 men and children came to the plant clinic, although only a handful brought samples. These included fruit trees, mango with three problems; gall midge, mango shoot psyllid, and malformation. Banana (Story 2) and Lychee (Story 4) were also brought in. Onions and country bean are grown extensively in Natore and these too, were clinic patients. Turmeric showed yellowing and wilting leaves, and a field visit revealed that all plants were like this, possibly suggesting a nutrient deficiency or nematode damage, especially if the land had been tilled which would redistribute the worms.

Farmer Abdul Hamid uses four types of pesticides to control the brinjal fruit and shoot borer, up to 64 times in 5 months (twice a week). He uses stronger and stronger pesticides when the others don't work, a sure sign that resistance has developed. Using stronger pesticides is a pesticide treadmill, once on it is difficult to get off. Paula Kelly asked Abdul what he used to practice years ago to control the pest. He said he has always used pesticides. And what about your father, and father's father, what did they do? Adbul said

that he understood, and that they didn't have a problem in those days.

The clinic at Tirail (no 7) was held outside the office of the deep tube well club. Here, the new lychee problem was observed (Story 4), thrips affecting brinjal and chilli were diagnosed, and banana with the rotting mid leaf was also brought to the clinic. We did a swift test to see if the banana was affected by bacteria by doing a streaming test (putting a bit of tissue in water to see if bacterial pus flows out), however results were inconclusive. Twenty farmers were interested to join in discussions at the clinic, however even more people just were happy to stand and observe.

Mohammad Ali is head of the organisation responsible for sanitation and hygiene in the Natore district. It is at the office in Jonail that plant doctors Nuran Nabe and Asmara Begum run the plant clinic on a Tuesday morning. Mohammad thinks that the plant clinic is a good idea here, as there is only one extension agent working in the area, who is not able to give help to all of the people who need it.

He said that outside of office hours, people come to ask for help, and he refers them to other clinics and the AAS central office in Bonpara. But he is keen for there to be a plant doctor in the office always. The Deputy Commissioner, a high ranking DAE official and colleague of Mohammad's, recently suggested that the plant clinic should add soil testing facilities.

Around 8-10 people came to the clinic. Papaya leaves are stringing and mottled, distinct viral symptoms, which affect 30% of farmer Ujjal's 135 trees. If they bear fruit, it is distorted and small. The tree was two months old when the problem started, and now they are four months old. Lychee leaves, nibbled at the edges, were diagnosed with leaf feeder damage as were blackberry. Small and fallen jujube fruits were also investigated (Story 5).

A chilli plant was brought into the clinic with downward curling leaves, and tiny holes puncturing the mid ribs of the leaves. Mite or thrip damage was suspected although we wanted to go to the field to confirm our suspicions as we couldn't see any insects on the sample. Most plants in the chilli plot showed the same symptoms. As these insects preferred cooler evening temperatures, and as our field visit was during the morning heat, we only saw one or two mites on the plants. Thrips, are also very fast movers so it was unlikely that we would see these too. We suggested that the farmer do a mini experiment and spray a few plants with miticide and a few with a recommended insecticide and monitor results.

The Going Public event at Jonail is normally scheduled between 6 and 7 AM, when the farmers arrive at the market for trading. This time we held the event after 10 am when most farmers had gone home. The market was still busy and some traders shovelling piles of garlic into jute bags. Some people were interested in the Going Public on brinjal fruit and shoot borer and asked many questions. Other farmers however were interested in other crops and we told them that they could come to the Tuesday clinic.




Clinics, farmers, plant problems and Going Public in Natore


What the stories tell us

Numerous farmers and producers come to the plant clinics to consult with trusted plant doctors, who have become popular and respected members of their communities. Clinics provide a vital and regular service for the community, and farmers bring their samples here for a quick diagnosis.

Although the plant clinics are new and exciting, no one gets everything right the first time. These stories show a few areas that need improvement. For example, people seek attention at the clinics out of hours. Although Natore is a large district and clinics are spaced out, all of the clinic times and opening hours should be posted at each of the permanent clinics, and at the GP event. People may make a special trip to visit another clinic. Post a contact name and number at the clinic so that people who can't visit other clinics can phone up for advice.

Few women were at the clinics. Think of ways to motivate women to attend i.e. running clinics at different times or doing 'house visits'.

Some clinics were dark. Poor light makes symptoms difficult to see.

It is good to have basic equipment* at the clinics for handling the samples. Pocket knives are great for cutting into fruits and stripping back bark to look for internal vascular staining.

Show farmers how to collect samples*. The ones sent to laboratories miles away have to be carefully selected and not mishandled. Ask the farmer to look at the roots too, which are often forgotten. Have a simple sample-collecting box that can help to keep samples cool.

It is obviously more satisfying to have an answer than to say 'I don't know,' but plant doctors need to take their time* at making a diagnosis. Ask the clinic visitor about the severity or disease incidence or how the problems started. Background information is key to learning the etiology of the problem. It is commendable that the plant doctors are slowly learning the complexities of unravelling plant health problems, and their dedication and devotion to the running the clinics be recognised.

*Refer to Plant Detective Story 6 in REPBD5 Mobile Clinics & Local Knowledge in Bangladesh (April 2004) for more information on collecting samples, equipment and diagnosis.

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