

Trip Report for visit to India from 13-31st January 2002
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I traveled by plane to Delhi from Kathmandu on 13th January 2002 with the objective of looking at various RCT activities in Haryana, Punjab and Bihar and then attending the workshops in Delhi for GIS and then PRISM ADB activities.

Bawal area in Haryana

I traveled with Jay Cummings (South Australia TOPCROP contact) and David Coventry (University of Adelaide agronomist) to Haryana. David is studying various tillage activities in the RWC as a study leave assignment with CIMMYT. We met Dr. RK Malik and Ashok Yadav on the road to Jaipur at the turnoff to Bawal to see some bed planted and weed control work in farmer fields. There is an HAU regional station at Bawal for dryland crops. This area is a pearl millet/guar (cluster bean – Sinopsis) – wheat/mustard cropped area. Irrigation is available from tubewells but water is a scarce resource. Since the introduction of irrigation the gram crop has reduced significantly. Yields of this crop were low. The soils are sandy in texture.

Dr. Malik and his team at HAU are introducing bed planting in this area with the main objective to increase water productivity. This is the second year of the work that is still in the demonstration stage. Innovators have been identified and last year results were very encouraging to Malik and to the farmers. There is an expansion and more interest this year. Ashok and a graduate student from HAU have placed 27 demonstrations in farmer fields, each at least one acre. We looked at some of these. The crop was very good.

In addition to bed planting, plots were split to look at weed control (weedy check and handweeding and 3 herbicides, metsulfuron, trisulfuron and 2,4D). The main weeds were *Chenopodium album* and onion like weed (??). We all felt that mechanical weeding and fertilizer placement in the center of the bed also need to be tried. Permanent beds are also needed to help stabilize these sandy soils. Farmers want to try millet in the furrows and guar on the top of the bed next Kharif season. Mustard is already planted in the bottom of a shallow bed and furrow system. Fertilizer topdress nitrogen superimposed treatments included placement in the furrows, on top of the beds, and broadcast over the entire plot.

We saw three farmer demonstrations. All agreed they like the technology. Water saving was the most important factor. An acre of flat planted wheat took 6 hours to irrigate, and bed planted half that. Although, farmers felt they would have to irrigate more frequently. What is needed is a total water use by system. The bed planted wheat looked better than the flat planted and rooting systems were more extensive in bed planted wheat. Farmers will definitely expand this system next year and Malik will be encouraging purchase of a suitable drill and more farmer experimentation. Last year yields exceeded 5t/ha. One serious problem was termites. This had damaged some of the crop stand and is an issue for IPM.

We traveled to Delhi for a quick stop at the CIMMYT office and then traveled to Karnal for a night stay.

Karnal, Haryana

After breakfast, we visited a farmer where there was a block on 98 acres on no-till. The farmer Sahab Singh also planted additional acres for his neighbors for a total of 150 acres with his one drill. Last year he planted 12 acres and averaged 6.2 t/ha. Farmers normally do 8-10 ploughings and the cost is 125 rupees per acre or 1000 Rs for land preparation without the cost of laddering. Rental charges for no-till are 250-300 Rs/acre.

Patiala District in Punjab

I was to meet SS Brar from PAU and see the work in Patiala District but unfortunately he couldn't make it. Instead SS Dhillon met me and we looked at his bed planting adaptive research plots in farmer fields. We saw many of these that are needed by the Punjab extension service before the technology can be recommended to farmers. All were excellent and showed the benefits of this technology. They will be assessed independently and then a decision made on whether to recommend in the State. I believe this will happen soon.

We also saw some no-till. Kulwinder Singh in Mardanpur, Patiala had one of Dhillon's bed planted trials that he liked. When we asked him about no-till he responded very positively. He has a heavier soil and land preparation is a problem and 8-10 ploughing is common. He says he uses 50% less water with no-till, the crop doesn't yellow after the first irrigation and he saves a lot of money. He showed us an excellent 2.5 acre block and says he will plant all his land next year this way. He was reluctant at first until he saw the germination. The field was also much darker green indicating some benefits to nitrogen management. This was also noted in all the bed planted plots. In fact chlorophyll meter readings confirm this. We saw another farmer Sucha Singh in the same village with 3 acres this year and the same comments.

We also visited the KVK (extension-research for farmers) and Dr. SS Mali and JS Chanda. They are active with a DFID project managed by John Witcombe. They have placed 13 acres of no-till and bed planting demos in the District. In one place they have an 80 acre farmer block and in the same village 1000 acres has been planted with no-till. The KVK farm has 38 acres of demonstrations and had good no-till and bed planting. Dr. Mali was optimistic about both technologies and feels there will be a rapid expansion next year in Punjab. He tells that farmers are very receptive to both technologies. We hope to foster greater collaboration with this active KVK in the future.

Ludhiana District

After a full day in the field we returned to PAU, Ludhiana for the night. On 16th morning I visited the village of Sudhar and saw the 4 DFID trials that are monitoring bed planting in farmer fields and comparing with flat planting. Dr. Dhillon had to give a class and I went with Mr. Randhawa, his research fellow. All the plots were good and had just been cultivated for weeds mechanically and had fertilizer placed between the two rows of wheat. The bed planting was superior to the flat and much greener. Farmers like the technology but need to get access to the drills to expand further. I am suggesting we buy a few drills from the leftover DFID money and have them placed at the disposal of farmers to accelerate adoption next year in these villages where the technology is liked by

farmers. I suggest we either ask the farmer to pay for the drill at the end of the season or at least insist he plants 100 acres for others. Once the technology is approved by the State then the speed of adoption will also accelerate.

We had tried to contact Daler Singh, from extension and see his work. He had placed many acres of bed planted wheat with mint intercropped in the furrow last year, but we couldn't communicate. We did look at his family farm and this year he is experimenting with two new systems for wheat-mint planting. Last year the wheat crop was too vigorous and the mint variety selected too shade susceptible so that the mint yields were poor. This year he has either planted 70cm beds with one row of wheat and one row of mint on the top of the bed, or he has made 140 cm beds, planted 3 rows of wheat in the middle and mint on either edge. I think he will get less wheat yield (but not significantly so) but much better mint yields. This will mean more income.

We continued to visit adaptive bed planted trials as we proceeded to Amritsar. At Indna Klasske village we visited the farmer who had grown rice on beds last summer. He got 7t/ha average on all the plots and 8t/ha on one plot. He wanted to grow wheat on beds but didn't have the machinery available. So instead he planted his wheat after land preparation and then using his sugarcane ridger placed furrows every 140 cm in the tractor wheels. The crop looked good and this system may be an alternative if machinery is a problem. This would be one farmer I would like to get a drill. We also met another farmer Umranagal Singh in Beas village who had planted 3.5 acres on beds with his own resources. He also had no-till but it was not as good. Training is needed for all these new technologies.

After the sun set we arrived at ASS Foundry and Aroor Singh, the innovative local manufacturer who has done so much to help develop equipment for bed planting and no-till. We had good discussions and then left for PAU.

PAU farm experiments

The 17th morning we visited experiments of Dhillon on the PAU farm and experiments on bed planting with agronomy and soil departments. Dhillon's experiments were impressive. He looking at many aspects on the agronomy of bed planting including seed rate, fertilizer, rice, soybean and maize-wheat bed systems, weed control with herbicides and mechanical weeding, irrigation and mentha-wheat/chickpea bed systems. Some of these experiments have been conducted for 2-3 years and results will add to the knowledge of bed planting.

We then met with GS Nanda, the ex-Director of wheat at PAU and now the new Director of research. We had a good discussion about RCT's but also the seriousness of mono-varieties of wheat in the region and the large acreage of PBW 343. He was very supportive of the RCT work being done and praised Dhillon for his bed work.

Krishna Kumar, from agronomy showed us his trials on bed planting. He was looking at planting method by irrigation scheduling. Planting method included planting at field capacity, planting dry and then irrigating or irrigating after bed making and then planting.

This was for rice-wheat systems. Other experiments were looking at rabi-maize on beds and brassica on beds.

We visited Dr. AS Sidhu from soils and his trials on beds. He was looking at fertilizer by irrigation interactions on rice and maize-wheat systems including timing of irrigation. In rice they will look at direct seeded versus transplanting on beds with and without tillage. His bed planted plots were good. Dr. Dhillon was providing valuable technical support for all these trails.

I then left by car for Delhi arriving in 5 hours with a 30 minute stop for lunch. The road is much improved and traffic was not a problem.

Patna Bihar

On the 18th I flew to Patna from Delhi and was met by various scientists involved with the ADB project. They included Dr. Mritunjay Kumar (ADB coordinator) and Dr. Subash (Engineer) from RAU Pusa, Dr Sinha (pathologist) from ARI Patna and BK Singh the ex-Director ARI, Patna and now hired to help with the ADB project. We were also joined by Joel Ransom, CIMMYT's maize scientist in Kathmandu. John Gaunt also arrived from Calcutta for a review of his DFID project in Bihar. I would join that review later. John also joined us for a field visit to ADB sites on 20th.

We traveled to RAU Pusa and stopped on the way to see some of the ADB activities. A Farmer, Aditya Nath Kumar in the village of Bazitpur, Vaishali District had grown 20 acres of 0-till on his farm with a drill supplied by ADB. He had no-till, reduced till (just one-tillage pass before planting) and conventional. This would be a common scenario as we looked at the ADB work. Farmers didn't believe you could plant wheat without tillage. In fact, AN Kumar had been ridiculed by his family when he tried. He had found out about the technology from a bulletin and he approached RAU for help. Some farmers insisted that one-tillage be given, others ploughed up their fields after no-till, but some waited for germination and were elated by the response. Next year there should be less reluctance to try no-till. We all agreed that we must organize traveling seminars and field days for farmers so we can show them that no-till works. Then next year there will be less resistance.

One issue is weeds. These are more prevalent in this Eastern area, especially on highland. The main problem is *Cynodon dactylon* (Bermuda grass). This can be controlled with herbicides like paraquat and glyphosate (the latter is best but more costly), but farmer training on herbicide application is a must. Monsanto should get involved in this effort. Sprayers and chemicals are also not readily available and it may be easier to give one ploughing or have farmers do a better job of weed control in the previous rice crop. However, observations seem to indicate that reduced till wheat didn't grow as vigorously as zero-till wheat. It was not as green and may have been affected by excessive water during irrigation and maybe some nitrogen leaching.

The farmer AN Kumar was so taken with no-till that he also had planted no-till maize and sunflower. Both were planted with a two pronged stick – seed in one hole and fertilizer in

the other. This was done on poorly drained, waterlogged land that was too wet for ploughing. The maize looked very good compared to neighboring maize planted with land preparation but much later (23rd October versus 6th December). They had used glyphosate in some plots. The farmer couldn't believe that anything would emerge, but the chemical worked well and the grass disappeared leaving a good wheat crop. This was on a 15 acre plot planted 5-9th January. We then went to RAU for the night.

The next day we spent all day in the field looking at variations of the above. The story was the same. No-till looked good and better than reduced till but on highlands weeds were a problem. On medium land after rice no-till was excellent. M.Kumar and Subash have worked day and night to get 500 acres planted this year of either reduced or no-till. Next year this will expand significantly IF seed drills can be made available.

We met several farmers who had been abused by other farmers because they had used no-till. Dinesh Kumar has 1.5 acres, 3 children and a wife to support. He agreed to plant no-till on 1.0 acre of his land on 20 December. For a week he couldn't leave his house because of the negative comments from his fellow farmers. Only after the wheat germinated was he able to come outside. But by then the other farmers had realized he was right and they were wrong. He became a popular person in the village and many farmers continue to view his field and discuss with him.

Another example is Sanjay Kumar Thakur, another young farmer. His Father beat him after he had used no-till and he was forced to leave the village of Laxrampur for 10 days to avoid the abuse heaped on him. However, once his Father saw the germination he asked his son to return. I am sure there are many other examples.

We visited some Deara land (river bank flooded land) in Bagla village where no-till was tried very successfully. There are many acres of Deara land in Bihar that can grow good wheat crops with no-till. The main benefit is time. Farmers can plant early and avoid the costs of land preparation and thus get higher yields.

On 19th we visited sites near Muzaffapur. Here we saw similar no-till plots but also plots of potato and maize. These are both crops being promoted by the ADB project for diversification of cropping in Bihar. New and better potato varieties and good quality seed were introduced by the central potato institute in Patna. CIP, the site coordinator for the ADB Bihar work also helped. All the crops looked good. We did see a demonstration plot of a 4-wheel tractor potato planter. The results were good and this will reduce substantially labor costs. The project needs to assess what impact this has on resource poor that are hired and get employment in potato cultivation. Farmers in this area plant rabi-maize on the side of the beds after potato planting. This seems to be a good inter-crop system although it means the potato will have to be hand harvested since the maize matures after the potato.

After an excellent day in the field we returned to Patna by road for the night. The next day we traveled to the ADB sites managed from Patna. John Gaunt (DFID) and Sunil (a

social scientist with catalyst international and working in the DFID project on group formation and micro-credit) also joined us for the day.

The first stop was Yusufpur, a village selected closer to Patna to represent Tal land. This is lowland that is flooded in the monsoon but good for rabi cropping in the winter. We saw excellent fields of no-till wheat. The soil was heavy and it takes repeated ploughing to break the clods and 4000 Rs/ha cost. This is an ideal area for no-till that performed very well in these heavy soils. The farmers planted when the fields were moist but didn't plank. The seed emerged from the slit without problem. There were some weed problems, but those could be controlled with paraquat. This problem was found in fields where farmers didn't give any care in the rice crop. In fact, farmers give researchers the worst plots and then sit back hoping they will make fools of themselves. Next year the whole village will be interested to try no-till on all fields, good and bad!! Phalaris minor was a problem in some fields and will require some herbicide for control. We also saw some plots of surface seeding. Farmers ploughed, irrigated and then broadcast seed. The fields looked good. We then had a good group discussion with farmers in the village center and agreed to come back soon to start activities for the next season. Sunil was very helpful here because of his experience with group formation and talking to farmers. I think ADB needs to consider using his talents for community level activities as a consultant with the ADB project.

We then proceeded to KVK at Harnout. This active center is helping with the activities in the ADB village site of Lahori. On their small farm we saw wheat no-tilled after different rice treatments. In the rice season they have direct seeded, non-puddled rice and transplanted puddled rice. The fields looked good but harvest is needed before drawing conclusions on whether no-till wheat is better after non-puddled rice or not. The KVK staffs are also very active in the ADB village of Lahori.

In Lahori, village we met happy farmers. They have planted 12.5 acres on no-till wheat in the village this year. Most of this is on the lower, poorly drained, heavier textured land after rice. The farmers are now convinced about no-till and the acreage will expand next year on the middle land and in neighboring villages. This village has a lot of good upland and farmers use this mostly for vegetables and potatoes. The CIP and the CPI, Patna have done a good job of introducing new varieties and good quality seed. Kufra Ashok is an early variety introduced to help farmers get early harvest and good prices. The project is suggesting wheat be planted after the early potato is harvested. In this way, the yield of potato is good, the price is very good, profits would be high and wheat is possible. However, some farmers wanted to wait longer, maybe get more potato yield, and take the risk of a lower potato price and maybe plant maize instead of wheat or some other crop. Onion is another crop being promoted after potato planting. It may be interesting to use the bed planter after early potato, since the soil will be friable, and plant wheat or other crops on the beds. In this village there is very little maize intercropped with potato. Maybe this should be tried. If not, then the potato planter and digger would be useful since labor is scarce.

We then traveled to the second ADB village being coordinated from Patna at Madadpur. The KVK at Barh is also very active at this site. More than 150 acres of no-till wheat and 25 acres of no-till lentil have been planted at this site. No mean achievement for the first year. The no-till lentil was planted with the same drill on Tal land. This is land flooded in the summer but used for rabi-cropping in the winter, mainly rainfed. Lentil, chickpea and lathyrus mixed with brassica, linseed and peas are a common mix. The no-till lentil looked very good and farmers want to do more next year. Since the legumes are usually mixed with other crops scientists should look at ways to add mixtures to the drill. The KVK was also experimenting with 2 new lentil varieties, Arun and Malika. No-till also worked with only 60kg seed/ha instead of the normal 80-100 kg. At 16 rupees per kg this is a substantial saving. No-till lentil also allows earlier planting and higher yield.

The no-till wheat (150 acres) was also impressive in a large block on land with some irrigation and planted after rice. We also saw good crops of potato using the two new varieties listed above.

We had a short farmer group meeting. They were very happy and said that this was the first time they had had a visit from scientists and extension in 50 years!! There is an issue of excess production that needs attention. They are in the process of forming clubs where they can sit and discuss issues. They do need the machinery to be available on time and need training on its proper use. We returned late to Patna after a very good day.

DFID-DWMR Project

I was invited to attend the DFID review meeting at DWMR/WALMI on 21st afternoon. Margaret Quin, Director of NRSP was the chief guest (NOT Queen, as some thought!!). John Beeching, from Bath University was also on the review. John Gaunt from Rothamsted is overseeing the project from UK and SR Singh from DWMR and India. Both gave presentations on the status. DWMR is using the water user associations for extending technology. They are looking at various technologies including no-till wheat (237 acres planted this year) and getting earlier seedbeds with irrigation so rice can be planted at the start of the monsoon and utilize the rain water. They are also using Catalyst Management Services in Bangalore for social science issues. This group has already formed 84 self help groups in the command area (Sone canal RP Channel 5 outlet) based on micro-credit with much success. This seems to be a good way to enter a village. The RWC should consider using the same consultants for their work in the ADB sites. MS Ashok, the leader of this private company will attend the RTCC in February and discussions can be held then.

Margaret Quin said that NRSP's goal is to "Create new knowledge to help people to improve their livelihoods". This simple statement is packed with complex ideas but is the basis for this project. She raised the questions of "how to improve", "what knowledge", how to transact change across all socio-economic groups" and "what policy changes are needed".

On 22nd, I was able to travel to Bikram in South Bihar and visit one site at the RP5 outlet. We saw no-till wheat, new lentil varieties and surface seeded lentil. There were weed

problems in the no-till wheat and discussions were held on how to solve that problem. I suggest that the ADB sites and staff have a strong linkage with this project since there is possible synergy on many topics and room for exchange of technology and methodologies. We asked John to present something at RTCC with MS Ashok and also asked if Margaret Quin could join us. She will check her schedule and let us know.

I had to catch a flight to Delhi and could not accompany them on the rest of the field day. I appreciate SR Singh allowing me to participate. Scott Justice was with me and stayed the rest of the day and attended the presentations the next day. He will mention the outcome in his report.

I arrived in Delhi and attended the GIS and PRISM workshops being conducted under the RWC in Delhi. Both were excellent and the participants appreciated the efforts made. Professor AK Gosain at IIE in Delhi was a very good find for the RWC and gave excellent support for this and future work on GIS. Jeff White and Dave Hodson helped from CIMMYT and Steve DeGloria was a good addition from Cornell. Frans Neumann, Ruud Crul and Marijke Kuipers came from the Netherlands for the PRISM training.