Boosting chickpea production in Nepal

RIU

Validated RNRRS Output.

Growing high-yielding chickpea varieties as a fallow crop after rice or wheat could provide food security and much-needed incomes for the poor in Nepal. Chickpea is the main source of protein for around 1.8 million Nepalese people. So it was a major blow to the country when in the 1990s chickpea production collapsed because local varieties failed. This was partly a result of pests and diseases. Now, 90% of the country's chickpea has to be imported. The development of a tailored, low-cost, integrated crop management (ICM) package means that poor farmers in Nepal can now grow new high-yielding varieties reliably and sustainably. The package has been proven to work in various areas of the country, providing the poor with high yields and incomes.

Project Ref: **CPP35:**
Topic: **1. Improving Farmers Livelihoods: Better Crops, Systems & Pest Management**
Lead Organisation: **Natural Resources Institute (NRI), UK**
Source: **Crop Protection Programme**

Document Contents:

Description

CPP35

Research into Use
NR International
Park House
Bradbourne Lane
Aylesford
Kent
ME20 6SN
UK

Geographical regions included:

Nepal,

Target Audiences for this content:

Crop farmers,

A. Description of the research output(s)

1. Working title of output or cluster of outputs.
In addition, you are free to suggest a shorter more imaginative working title/acronym of 20 words or less.

Development and promotion of high-yielding production of chickpea on cereal fallows: a poverty alleviation technology producing increased income and protein for poor farmers in Nepal.

New high yielding chickpea: a way out of poverty and hunger for poor farmers in Nepal, India and Bangladesh

2. Name of relevant RNRRS Programme(s) commissioning supporting research and also indicate other funding sources, if applicable.

Crop Protection Programme

The project built on an earlier pilot project to improve chickpea crop management in Nepal funded by ADB & IFAD.

The project contributed information and IPM strategies to IFAD's Rice Wheat Consortium programme in India, Bangladesh and Nepal and consequently received some support in return. IFAD as an uptake platform for this work is described in more detail later in this dossier.

3. Provide relevant R numbers (and/or programme development/dissemination reference numbers covering supporting research) along with the institutional partners (with individual contact persons (if appropriate)) involved in the project activities. As with the question above, this is primarily to allow for the legacy of the RNRRS to be acknowledged during the RIUP activities.

R7855 1 April 2004 – 31 July 2003
Promoting the adoption of improved and integrated disease and pest management technologies in chickpea by poor farmers in mid hills and hillside cropping systems in Nepal.

R8366 1 April 2004 – 31 March 2005
Policy and strategy for increasing income and food security for poor farmers in Nepal and South Asia through improved crop management of high yielding chickpea in rice fallows

R8427 1 April 2005 – 31 Jan 2006
Ensuring the sustainability of an integrated crop management approach to chickpea production for poor farmers through up-scaling and far-reaching adoption in Nepal

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4. Describe the RNRRS output or cluster of outputs being proposed and when was it produced? ***(max. 400 words)****. This requires a clear and concise description of the output(s) and the problem the output(s) aimed to address. Please incorporate and highlight (in bold) key words that would/could be used to select your output when held in a database.*

The principal output was to develop and implement a strategy to reduce poverty in vulnerable rural poor and increase food security by promoting the growing of high yielding chickpea as a fallow season crop after the main rice or wheat crop.

There had been a serious decline in chickpea production in Nepal 50,000 Ha in 1989 to less than 10,000 Ha in 2000 Chickpea cultivation had collapsed in Nepal in the 1990's because of the failure of traditional varieties and growing practices to control pests and diseases. Chickpea is a principle protein source for an estimated 1.8 million Nepalis and the decline in production created a major shortfall in local supply only met by imports amounting presently to 90% of the countries needs. This is a severe drain on an extremely poor and strife torn country.

This output comprised an **integrated crop management** strategy that consisted of a **basket of technologies**, a promotion strategy and other dissemination tools. Participatory evaluation and 2 major livelihood studies were used to monitor impact in detail. Thus the project comprised several component outputs.

1. **A survey of chickpea production constraints** that had caused the decline in production and the impact of their management on family income, nutrition and poverty in Nepal. This provided the project with a clear idea of what the problem was and how it needed to be addressed.

2. A **low cost integrated crop management (ICM) package** appropriate for poor farmers in Nepal to enable them to grow new high yielding varieties reliably and sustainably was developed with and validated by farmers through participatory trials and shown to more than **double yields** and generate increased income. The high yields and incomes obtainable from the new chickpea varieties could only be realized if poor farmers had access to better and appropriate technologies for the management of pests and diseases.
3. **Promotion tools** produced and disseminated to **more than 7000 farmers** in Nepal and the ICM technologies **promoted and demonstrated** directly through **farmer schools to > 3000** in Central, Western and Eastern Nepal.
4. Impact of chickpea ICM on rural livelihoods, poverty alleviation and nutrition in target districts evaluated.
5. Publications evaluating new IPM systems in peer-reviewed international journals and in appropriate local media (radio, newspapers etc).

5. What is the type of output(s) being described here?
Please tick one or more of the following options.

Product	***Technology***	***Service***	***Process or Methodology***	***Policy***	***Other Please specify***
X	*X*		*X*		

6. What is the main commodity (ies) upon which the output(s) focussed? Could this output be applied to other commodities, if so, please comment

Main commodity: **Chickpea**

Yes. The outputs could have broader impact. The concept of integrated (multifunctional) crop management could be applied to other similar high value nutritionally important legume crops such as pigeonpea and lentil. Moreover, these outputs could be applied to the growing of legumes in similar rain fed cropping systems across Asia and Africa.

Crop diversification, especially as part of an improvement program for legumes in rainfed cropping is considered by most development policy makers to be a key element of any national development strategy, in this case for Nepal. The Agricultural Perspective Plan Support Program (APPSP) of the Ministry of Agriculture and Cooperatives in Nepal for example recognises the importance of crop diversification particularly for legumes. Developing chickpea as part of a farming system (e.g., rainfed rice systems) rather than as a single commodity may also be a good way to broaden the scope for taking this output forward.

7. What production system(s) does/could the output(s) focus upon?
Please tick one or more of the following options. Leave blank if not applicable

Semi-Arid	***High potential***	***Hillsides***	***Forest-Agriculture***	***Peri-urban***	***Land water***	***Tropical moist forest***	***Cross-cutting***
X		*X*					

8. What farming system(s) does the output(s) focus upon?
Please tick one or more of the following options (see Annex B for definitions).
Leave blank if not applicable

Smallholder rainfed humid	***Irrigated***	***Wetland rice based***	***Smallholder rainfed highland***	***Smallholder rainfed dry/cold***	***Dualistic***	***Coastal artisanal fishing***
X		*X*		*X*		

*9. How could value be added to the output or additional constraints faced by poor people addressed by clustering this output with research outputs from other sources (RNRRS and non RNRRS)? (**max. 300 words**).*

Please specify what other outputs your output(s) could be clustered. At this point you should make reference to the circulated list of RNRRS outputs for which proformas are currently being prepared.

The project could be clustered with the plant science projects on seed priming in legumes (R6395, R7438 R7540 R8221 R8269) though the project has already integrated this technology (pre-soaking seed prior to planting) into its existing chickpea management system. Other candidates for clustering are with the management of pigeonpea technologies project (R8481, R8205, R7452) and reducing Aflotoxin levels in groundnut (R8483, R7809 and R8298) also based at ICRISAT for an "**Improved legume management in Asia and Africa**" cluster aimed at promoting new safe legume crop technologies to improve income generation by rainfed smallholder farmers in Asia and Africa.

The most obvious non RNRRS innovations platform to cluster this work with is the IFAD supported Rice Wheat Consortium for Indo Gangetic plain, with which the project has already been working in its final phase. The RWC is seeking to promote improved and more sustainable cropping systems in this semi-arid aro-ecosystem in Asia by working with NARS and poverty focussed NGOs in India, Pakistan Nepal and Bangladesh as well as appropriate ARI's, including ICRISAT, CIMMYT and IRRI.

Validation

B. Validation of the research output(s)

*10. **How** were the output(s) validated and **who** validated them?*

*Please provide brief description of method(s) used and consider application, replication, adaptation and/or adoption in the context of any partner organisation and user groups involved. In addressing the "who" component detail which group(s) did the validation e.g. end users, intermediary organisation, government department, aid organisation, private company etc... This section should also be used to detail, if applicable, to which social group, gender, income category the validation was applied and any increases in productivity observed during validation **(max. 500 words)**.*

The outputs have been validated:

1. Nationally, by more than 3500 farmers (end users) under the guidance of the project team, and using information sheets, in 20 districts across Western, Central and Eastern Nepal. Surveys were conducted to determine the impact of the outputs in years 2001 and 2003.

2. Additionally farmers directly involved in Plant Sciences Research Programmes seed priming projects (end users) were given Avarodhi seed by the NGO FORWARD (intermediary organization), from our seed multiplication plots at NARC, Nepalgunj and Khumaltar and were provided with the Nepali language information promotion sheets from this project cluster to use to produce their chickpea.

3. Department of Agriculture, (government department) the principal agricultural extension vehicle of Nepal under the Ministry of Agriculture has also given full support and validated the outputs of this project cluster by promoting to farmers in areas the present project was unable to reach. This project cluster provided training for trainers in DoA and information sheets.

4. The IFAD led RWC have also validated findings from this project in developing elements of rice wheat consortium activities in Eastern India.

This farmer validation in Nepal was evaluated via a survey (questionnaires) of approximately 500 farmers systematically sampled who had experience of using the technologies. This survey has been published as ICRISAT Information Bulletins No.s 65 and 66. The results were used to evaluate the impact of the technology on family income, on production, changes in crop preference, on housing, labour, and other family spending changes or additions resulting from chickpea production and finally on livestock ownership. Specifically, the impact on farmers' wealth was evaluated in terms of seed transaction benefits, sale of surplus product, reduced fertilizer burdens and subsequent increase in crop yield.

Internationally the work has been validated by scientific peers through publication of the research findings on crop management in international peer review journal, *Plant Disease*. Pande, S., Stevenson, P.C., Narayana Rao, J., Neupane RK, Chaudhary RN, Grzywacz, D., Bourai VA, & Krishna Kishore, G. (2005). Reviving Chickpea Production in Nepal Through Integrated Crop Management, with Emphasis on Botrytis Gray Mold. *Plant Disease*, 89, 1252-1262 and many ICRISAT bulletins and books.

*11. **Where and when** have the output(s) been validated?*

*Please indicate the places(s) and country(ies), any particular social group targeted and also indicate in which production system and farming system, using the options provided in questions 7 and 8 respectively, above **(max 300 words)**.*

The evaluation or validation of the outputs promoted on this project was carried out throughout the Terai in Nepal, across the following districts Bhardia, Banke, Rupandehi, Nawalparasi, Bara, Parsa, Rautahat, Sarla, Mahotari, Siraha, Saptari, Sunsari, Morang, Jhapa by farmers from a variety of ethinicities including Tharus, Thamangs (who have migrated from the hills) and Rajbansis The impact of their use was evaluated in all of these areas through interviews with a selected sub-sample approximately 500 participants. All were from smallholder farms in which community groups played important roles in developing support networks and for information

disseminations. These groups were from rainfed humid, rainfed dry/cold and wetland rice based cropping systems

In considering that originally the production system in focus for the project cluster was hillsides it became apparent that the outputs were equally relevant to the semi-arid system especially with respect to western Nepal, Northern India and Bangladesh which have very little rain during the winter months

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Current Situation

C. Current situation

*12. **How and by whom** are the outputs currently being used? Please give a brief description **(max. 250 words**).*

The outputs under this cluster of projects continue to be used by an estimated eight thousand extremely vulnerable and moderate poor farmers in 14 districts where they were demonstrated in farmer field schools of Nepal. In some places they have expanded the area under chickpea production so that it replaces entirely other crops such as tomato. For example in Lalbandi village, 400 farmers originally provided with enough seed and inputs for about 10 Ha expanded the area so that it is now grown on more than 100 Ha and chickpea has largely replaced tomato which was once the main winter cash crop. This was owing to much lower input costs for chickpea (tomato has a huge appetite for technology investment such as insecticides, microbial pesticides, fertilizers and water) combined with its high market value and highly non-perishable nature which allows farmers to manage release to market better and gain a higher price.

In most cases the product is being grown as instructed although in some areas farmers were able to customize inputs according to their own knowledge and needs. Most importantly, farmer groups were being established in some places to ensure seed supply since this is the most important factor in ensuring the outputs can be delivered and was invariably the most cited issues for farmers.

*13. **Where** are the outputs currently being used? As with Question 11 please indicate place(s) and countries where the outputs are being used **(max. 250 words).***

The outputs are currently being used in 14 of the 20 districts of Nepal (Bhardia, Banke, Rupandehi, Nawalparasi, Bara, Parsa, Rautahat, Sarla, Mahotari, Siraha, Saptari, Sunsari, Morang, Jhapa). As part of the up-scaling outputs from the final project extension (to Jan 2006), the Department of Agriculture (extension wing of MoAC) were trained in the use and promotion of the technologies and they continue to implement the production of chickpea using the developed ICM technologies under the umbrella of DoA extension activities in the districts.

In some villages in the central region farmers have completely replaced tomato with chickpea to provide a reliable, highly profitable and successful alternative to the vegetable that was costly in inputs and difficult to market quickly enough before perishing. A good example is Lalbandi, as described above, where in 2001 400 farmers were provided enough seed and technologies to sow a total area of approximately 10Ha. By 2003, they were growing 110Ha and this productivity continues to establish itself here, particularly among farmers familiar with the application of technologies since their experience had been with vegetables, which have high input

requirements.

NARC continues to provide seed materials, technologies and crucially technical backstopping for new farmers in and around Chitwan, Nepalgunj and Sarlahi with cooperation from ICRISAT as part of the Rice Wheat Consortium.

14. What is the scale of current use? Indicating how quickly use was established and whether usage is still spreading ***(max 250 words).***

When the project cluster started in 2000 503 farmers were recorded as taking up the new technology. By 2005 adoption had increased to 8000 and was very actively expanding in the Terai area traditionally responsible for 90% of the chickpea production in Nepal. Impact studies have estimated that if adoption continues to grow at the current rate then the technology would reach at least 20,000 farmers by 2010. However, direct involvement of Department of Agriculture extension services through training of extension staff and prioritising this strategy at Ministerial level was achieved in the final year of the project thus much greater take up could be achieved.

15. In your experience what programmes, platforms, policy, institutional structures exist that have assisted with the promotion and/or adoption of the output(s) proposed here and in terms of capacity strengthening what do you see as the key facts of success? ***(max 350 words).***

Under the Ministry of Agriculture and Cooperatives (MoAC) NARC and DoA were conspicuously uncollaberative. This meant that broadening the scale of the promotion activities, which had been developed with NARC, through the much larger network of extension provision of DoA was hampered. However, through the policy workshop held in Nov. 2005, (R8366) this project brought the director of DoA and Executive Director of NARC to the same table under the chairmanship of the Minister of Agrioculture, and members of the national planning committee, to develop a way forward in which NARC and DoA could work together by NARC training up DoA extension staff in the application and delivery of the technologies and DoA taking up the extension role previously handled by NARC during the development process. This partnership will be a key fact to the sustainable successes of the project. Also as a consequence of this partnership, the project developed a partner network including these national agricultural research bodies (NARC and DoA), international advanced research institutes (NRI & ICRISAT), private sector agro-input providers and civil society organisations including major NGOs (FORWARD, LI-BIRD etc) to provide a solid platform for promotion and further up-scaling.

An additional platform for up-scaling in Nepal revolves around the now well established Agricultural Perspective Plan Support Programme (APPSP). Key facets include the delivery of more effective services and outputs through the provision of additional resources and capacity enhancement at the district level. The programme supports the extension of appropriate agricultural technologies to the poor, marginalised, women, low-caste and ethnic groups of farmers paying particular attention to those in remote areas presently not well served by established extension services. It supports local level service planning and partnerships based on priorities identified in periodic district plans, to encourage agricultural livelihood opportunities that are in keeping with the national strategy, driven by the National Planning Committee.

Specifically the District Agricultural Development Fund (DADF) is the major operational tool of the APPSP consisting of the district extension fund (DEF) and local initiative fund (LIF). These decentralized funds are

available to NGO, cooperatives, farmer groups and private companies and local government to deliver agricultural extension & technologies and to input supply mechanisms and small scale agricultural infrastructure to poor farmers who have had limited access to such services in the past. The implementation of the DADF was included in the Immediate Action Plan of HMG Nepal in 2005. By channelling the outputs of this project through these new avenues will ensure its broad scale uptake throughout the country and to areas that are poorly served by the government extension services and outreach programmes that have suffered from neglect during the years of civil unrest. Non governmental players were particularly important in this politically unstable climate and state of civil war which characterised large areas of Nepal 2001-2006. This severely limited the traditional state organisations ability to implement development due to financial constraints and security considerations.

Environmental Impact

H. Environmental impact

24. What are the direct and indirect environmental benefits related to the output(s) and their outcome(s)? ***(max 300 words)***
This could include direct benefits from the application of the technology or policy action with local governments or multinational agencies to create environmentally sound policies or programmes. Any supporting and appropriate evidence can be provided in the form of an annex.

Because the chickpea production system developed uses more focused and less frequent application of pesticides for disease and pest control than used by farmers previously it has some direct effect in reducing environmental contamination by pesticides. As part of the project was to reduce the use of chemical insecticides even further the use of biological control using podborer NPV, a biological pesticide was introduced on a trial basis in Nepal. While promising' this is not yet reliable or available widely and quantitatively enough to be scaled up, though it represents a potential further component of the ICM that could be environmentally beneficial.

Another indirect benefit is that farmers have taken up chickpea in preference to tomato that itself involved much higher use of chemical pesticides to control tomato pests and diseases thus again reducing overall contamination levels in the farming system.

A further environmental benefit is the organic nitrogen fixing activity of chickpea which improves soil fertility without the need to apply chemical fertilizers that are a cause of runoff pollution to water bodies.

25. Are there any adverse environmental impacts related to the output(s) and their outcome(s)? ***(max 100 words)***

None reported or reasonably expected.

26. Do the outputs increase the capacity of poor people to cope with the effects of climate change, reduce the risks of natural disasters and increase their resilience? ***(max 200 words)***

The adoption of chickpea as a fallow season crop in addition to the staple cereals of wheat and rice means

households have an alternate source of food and income in the event of a failure of the main crop.