

A Quarterly Newsletter of Nepal Agricultural Research Council (NARC)

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NEWS/EVENTS

NARC Scientist Received Science and Technology Award

Mr. Bal K. Joshi, Scientist in Nepal Agricultural Research Council (NARC) has been honoured with Science and Technology Youth Award 2063/64 from Nepal Academy of Science and Technology (NAST). Prime Minister and the Chancellor of the Academy Girija Prasad Koirala gave away the certificate.

Mr. Joshi was honored with the award for his contribution in development of high yielding hybrid rice through identification of restorer (R) and maintainer (B) lines from the Nepalese landraces and cultivars.

Mr. Joshi identified five restorers (Radha-11, Kanchan, Sabitri, Kature and Ratodhan) and four maintainers (Bindeswori, Khumal-7, Deharadune and Chiunde) from the Nepalese landraces and cultivars using three CMS lines namely IR58025A, IR62829A and IR68888A. These restorers can be used to develop the hybrid seed and maintainers to maintain and/or to develop new CMS lines. Mr. Joshi had found a wide variation for heterosis among different characters. The F1 of IR58025A/Radha-11 had grain yield of 19.7 t/ha. This study on heterosis breeding of rice was the first time in Nepal. He suggests to initiate hybrid rice research on two lines system. Other contributions of Mr. Joshi are development of descriptors for sponge gourd, documentation of Nepalese plant genetic resources published by SAARC and identification of high yielding stable rice and tartary buckwheat genotypes.

Mr. Joshi, Master in plant breeding from IAAS-TU, has more than 100 scientific papers and 3 books published. He is Editor-in-Chief of Nepal Agriculture Research Journal published by NARC and SAS-N. His contributions on biometrics, plant breeding and biotechnology are well recognized among the agricultural scientists and students. Currently he is focusing on blast resistance breeding in rice using molecular markers and molecular breeding including quantitative trait loci (QTL) mapping for grain yield in tartary buckwheat.



Bal K. Joshi, Scientist, Nepal Agricultural Research Council (NARC) getting certificate of Science and Technology Youth Award from Prime Minister and the Chancellor of NAST, Girija Prasad Koirala

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Foundation Stone Laid for Gene Bank

Hon'ble Minister for Agriculture and Cooperatives Mr. Chhabi Lal Bishwokarma as a chief guest in a special program at Khumaltar, Lalitpur on 7 November 2007 laid foundation stone for Gene Bank.

The program held on Chairmanship of Mr. Dala Ram Pradhan the then Secretary of Ministry of Agriculture and Cooperatives was also attended by Mr. Bhim Neupane, Hon'ble Member of National Planning Commission. Dr. Nanda Prasad Shrestha, Executive Director of NARC welcomed to the participants and Dr. Madhusudhan Prasad Upadhyay, Senior Scientist, NARC briefed about the importance of Gene Bank in Nepal. Dr. Andreas Schild, Director General of ICIMOD spoke on Gene Bank. Farmer representative Mr. Rup Narayan Yadav spoke about the genetic resources that need to be preserved.

Gene Bank in Nepal anticipated since long time before is now going to be established at NARC, Khumaltar. A gene Bank is a facility for conserving and using the genetic resources in sustainable manner to meet the present needs and aspiration of future generation. The rich heritage of genetic resources which feeds and sustains human kind is conserved through seeds, semen, vegetative propagules, tissue culture, embryos, gametes or cells, DNA etc.

The Gene Bank to be established will be comprised of temperature controlled storage for long term conservation of orthodox seeds; In vitro conservation for recalcitrant seeds; characterization and evaluation laboratory; Seed germination and viability testing laboratory; Plant collection and introduction laboratory; Distribution and exchange laboratory; Documentation and database management laboratory; Seed processing laboratory; Cryopreservation laboratory; Field gene bank; Library; Conference room; and Museum. The gene bank upon completion will have capacity to conserve about 50,000 accessions of genetic resources.

Exhibition Room of NMRP Inaugurated

A newly established Exhibit Room and Learning Centre of National Maize Research Program (NMRP), Rampur was inaugurated by Hon'ble Minister for Agriculture and Cooperatives Mr. Chhabi Lal Bishwokarma on 18 December 2007. The Minister was on a field visit at Rampur. Hon'ble Member of National Planning Commission Mr Bhim Neupane was present during the occasion.

TB Thapa Appointed Secretary to MoAC

Mr. Tek Bahadur Thapa was appointed to the post of Secretary to Ministry of Agriculture and Cooperatives. He joined the Office on 22 November 2007.

Bharat Upadhyay Appointed as DG to DoA

Mr. Bharat Prasad Upadhyay was appointed to the post of Director General of Department of Agriculture. He joined the Office on 5 November 2007.

NARC Recognized for Research

International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) on 10 October 2007 gave a certificate of recognition to Nepal Agricultural Research Council (NARC) for outstanding research partnership with ICRISAT and CLAN.

World Cyclist with Agricultural Message

Mr. Ram Chandra Manandhar (Koshis) from Hetauda Nepal is touring around the world on a bicycle spreading the message of agriculture. Mr Manandhar after having visited all the zones of Nepal is about to leave for the capital cities of all the countries of the world.

Minister for Agriculture and Cooperatives, Chhabi Lal Bishwokarma and Minister of State for Education Mohan Singh Rathore bid farewell to Mr. Manandhar from Department of Agriculture, Lalitpur on 14 October 2007.

Mr. Manandhar after completing the cycle tour of all the known countries of the world in eleven years wishes to come back home country and climb Mount Everest and then live a life of agriculturalist with organic farming.

World Food Day Observed

The 27th World Food Day was observed world-wide on 16 October 2007 with the theme "The Right to Food". A program was held at United World Trade Centre, Tripureswor, Kathmandu. Hon'ble Minister of Agriculture and Cooperatives Chhabi Lal Bishwokarma was the Chief Guest in the program. FAO Country Representative Ms. Bui Thi Lan; Hon'ble Member of National Planning Commission Bhim Neupane, The then Secretary, Ministry of Agriculture and Cooperatives Dala Ram Pradhan; The then Director General of Department of Agriculture Dr. Dip Bahadur Swar, representative from political parties and farmers were present in the program. Different farmers, agri-entrepreneurs were awarded with prizes.

Raj Kumar Joshi Declared Martyr

Raj Kumar Joshi, who was murdered after abduction on July 04, 2007 while he was on duty at National Rice Research Program, Hardinath, Dhanusha under Nepal Agricultural Research Council was declared as martyr by the Government of Nepal on 20 August 2007.

A program in memory of late Joshi was held at Nepal Agricultural Research Council (NARC), Singhadurbar Plaza on 20 November 2007. The wife of Martyr Joshi, Mrs. Krishna Kumari Shrestha was handed over a cheque of NRs 1 million by the then Officiating Minister for Agriculture and Cooperatives Mr. Pradeep Nepal. The Program was Chaired by the then officiating Secretary of Agriculture and Cooperatives Dr. Hari Dahal. The then Officiating Executive Director of NARC Dr. Adarsha Pradhan highlighted the contribution of Late Joshi in the field of agriculture research and development. Joshi born on 25 December 1961 had been working for last 24 years as Agriculture Technician (T5) in the field of rice research.

Interaction on Yellow Rust Disease in Nepal

The Yellow Rust disease in wheat was wide spread in the hills that caused heavy loss in production in the last some years. With the view to share research experiences and to make out strategies to manage the disease, an interaction program was held at Plant Pathology Division of Nepal Agricultural Research Council (NARC) on 15 October 2007.

The interaction program participated by NARC Scientists from different disciplinary divisions, Agriculture Development Officers and Extensionist, plant protection officers from DADO and Agriculture Service Centers Kathmandu, Lalitpur, Bhaktapur; CIMMYT Representative; and representatives from some NGOs.

During the occasions, Ms. Sarala Sharma, Senior Plant Pathologist at Plant Pathology Division gave out information about the disease and research activities conducted with some achievements. Mr. Ashok Mudwari, Chief of Agri-Botany Division talked about the disease and importance of varietal diversification. Dr. Dhruva Thapa Senior Scientist (Plant Breeder) at Agri-Botany Division gave information about the resistant varieties. The DADOs from Kathmandu, Lalitpur, Bhaktapur talked about issues related to the incidence of disease and control measures.

The yellow rust disease that passes through air has come as disaster to wheat crops in the last few years especially in the hilly regions of country. Now the farmers seem to seek alternatives to wheat crops. Some varieties have been found resistant to yellow rust disease that are Pasang Lhamu and WK1204. The new resistant varieties of wheat has given hope to get rid of the disease and make farmers continue wheat planting.

Training on Grafting in Tomato and Eggplant

A two-day training on management of bacterial wilt and root knot nematode in tomato and eggplant was organized at Plant Pathology Division of NARC, Khumaltar. A total of 15 Agricultural Technicians from NARC, SIMI and CEAPRED along with six Nurserymen from Kavre and Lalitpur were given theoretical and practical knowledge on grafting. In the practical session, hands on training was given with grafting of eggplant and tomato on rootstock of wild eggplant, *Solanum sisymbriifolium*, that is resistant to Bacterial wilt and Rootknot nematode. This technology has great potential specially in Bacterial wilt and rootknot disease prone areas where farmers are harassed in tomato /eggplant cultivation due to these diseases.

The resource person in the training were Dr. Ram Devi Timila, Sr. Scientist, Mr. Ram Babu Paneru, Scientist, Mr. Tirtha Pokharel and Mr. Suraj Baidhya, Technical Officer.

Review on Hill Maize Research Project

A two-day review meeting on Hill Maize Research Project (HMRP) Phase II was held at National Agriculture Research Institute (NARI), Khumaltar on 11-12 December 2007.

The meeting had the objective to review the results of HMRP maize research and dissemination in Phase II (2003-2007) and to brief about on the goal, outcomes, outputs, activities and management of the HMRP Phase III.

In the meeting, Coordinator of National Maize Research Program, Rampur; team leaders from hill-research stations (Dailekh, Lumle, Kabre, Pakhribas) and Plant Pathology division presented reports of activities on maize varietal investigation, seed production (source seed and community-based seed production and marketing), plant protection (entomology, plant pathology and stored grain pest studies), agronomy, soil fertility resource conservation and post-harvest (on-station and on-farm).

The meeting was participated by representatives from CIMMYT, NARC and Regional and other Agricultural Research Stations, Department of Agriculture, Swiss Development Cooperation (SDC), Helvetas/SSMP, and IRRI different district agriculture development offices, regional labs, different NGOs, CBOs and Private entrepreneurs. Two Bhutanese maize scientists were also present in the meeting.

The Second Phase of the Hill Maize Research Project ended in 2007 that has the objective to develop a sustained capacity within the National Maize Research Program of NARC and in its research partners to generate maize production technologies; to develop technologies with and for poor maize farmers; to facilitate the dissemination of appropriate maize technologies through extension and input delivery channels.

The Hill Maize Research Project (HMRP) was initiated in 1999 with the goal of improving maize production and productivity in the hills of Nepal. The first Phase of the Project was accomplished in 2002 with some achievement in germplasm development, local training in breeding, soil fertility, entomology, GIS and social sciences and also in community-based seed production. Under the project, different maize varieties like Deuti and Shitala have been released and many other including QPM varieties are in pipeline.

Maize ranks second in production and consumption in Nepal. According to preliminary figure of FY 2007/08, the maize cultivation area in Nepal 870,166 hectare and production 1,878,648 mt and the productivity 2,159 kg/ha.

Gray Leaf Spot: A Threat to Maize Production in the hills of Nepal



Maize is the most important staple food in the hills of Nepal. However, sudden outbreak of a gray leaf spot (GLS) disease caused a great threat to this crop. Severe drying of leaves was seen in almost all maize fields in Kavrepalanchok district during 2006 crop season. Similar problem was seen in several villages in Lalitpur, Khotang and Ilam districts during same period.



Gray Leaf Spot Infected field

The loss in grain yield reached up to cent percent due to this disease. Many farmers could save nothing even for seed. The farmers were very much worried with this new problem of maize which they had never experienced earlier.

Sample of diseased maize from Dhungharka-8 along with a letter from District Agriculture Development Office was received at Plant Pathology Division on 19 September 2006 for identification of the problem. The stalk and roots of the plant sample looked normal while leaves except the upper most one



Gray Leaf Spot Infected leaves

dried and destroyed. When the leaf was examined the spores of *Cercospora zea-maydis* Tehon & Daniels causing

Gray Leaf Spot, was identified. This is the first record of the presence of this disease in the country (PPD # 5019, Dhungharka-8, Kavrepalanchok, September 2006). A survey team from NARC/DADO, visited several maize fields and collected samples from different villages of Lalitpur in September 2006. The same pathogen was recovered on those samples. Similarly the pathogen was found on many more samples from Lalitpur; Kavrepalanchok, Khotang; Ilam.

The disease was found increasing in 2007. It was also observed in Kathmandu Valley. It appeared in late stage of plants at Khumaltar. The pathogen was detected on leaves collected from Jagati in Bhaktapur and Narephat of Kathmandu too. The pathogen was recovered on samples collected from Mudhe

Sanischare of Tamaphok, Terhathum; ARS, Pakhribas, Dhankuta and Ilam districts.

The disease was also reported problematic in the eastern hills at Sukrabare, Angdim, Sidhuwa and Fachamara in Terhathum and Dhankuta. The production was decreased by 50 to 75 percent on Seti and Paheli local varieties. Ganesh 1 was found less infected as compared to local maize (ARSP, 2007). The problem was observed on local maize in higher altitudes at Kabre in Dolakha district (HCRP, 2007).

The drying of leaves beginning from August was rapid in September in Kavrepalanchok. The disease appears as long narrow rectangular lesions on leaves in early stage of infection. Ears were greatly reduced in size and kernels were very few and immatur. Kernels were sunken and often observed prone to secondary infection by other ear rotting pathogens.



Gray Leaf Spot Infected ears

A preliminary field experiment on loss assessment was conducted at Dhungharka in 2007. A loss in grain yield up to 19 percent was observed on local maize. Some fungicides were found significant in controlling the gray leaf spot disease.

Among the improved seeds of maize provided by NARC through District Agriculture Development Office for 2007 crop season, Manakamana-3, Deuti and Ganesh-1 were observed less affected in 2007 (CIMMYT/NARC/DADO during field visit). But Rampur Composite and Arun-2 were severely affected together with other disease. Maize plants at the altitude of 1400 m (Chalal Ganesthan VDC) were observed severely affected and more severely at higher altitude. Maize planted early in the season and at lower elevations was less influenced. At present it is prevailing in 9 hilly districts of the central and eastern development region in the country (see the map). Since the disease can easily spread by wind, it may infect in other districts and may cause problem very soon in coming years.

The disease is considered as an important disease of maize in world because it can reduce yield. Its incidence is known to occur in neighboring countries; India, China, and recently, Bhutan where Tilt (Propiconazole) fungicide was suggested to apply until the development of resistant maize (CIMMYT, 2007). Infected plants are the main source of primary infection for next season. Hence, all possible means of disease management including resistant varieties, proper tillage practices and application of fungicides should be followed in an integrated approach. Awareness to disease is necessary among the concerned organizations and farmers to manage the disease and prevent its spread further in new areas of hills.

●
- Ms. Gyanu Manandhar
Sr. Scientist (Plant Pathology)

Grafting Technology for the Management of Bacterial Wilt and Rootknot Nematode

Tomato is one of the most popular vegetables in the world ranking second to Potato in global production among the vegetable crops. In Nepal also, tomato and eggplants are important high value crops because of its high demand that help resource poor farmers in generating income. Plastic tunnel technology promoted the off-season cultivation of tomato throughout the year. But the production of these crops is negatively influenced by various pests attack affecting their yields, such as bacterial wilt (*Ralstonia solanaceum*), root-knot nematode (*Meloidogyne* sp.), eggplant shoot and fruit borer (*Leucinodes orbonalis*), tomato fruit worm (*Helicoverpa armigera*).

Bacterial wilt in tomato and eggplant is prevalent in different locations of tarai, foot hills and the valleys of midhills where



Bacterial wilt infected tomato and eggplant

the environment is warm and humid. This disease reduces yield losses up to 80% both in tomato and eggplant. The losses could occur up to 100% in the absence of proper management methods.

Rootknot nematode is a severe problem in tomato. The farmers at Pokhara, Kaski growing tomato under plastic tunnel reported



Root knot nematode affected Tomato root

about 40% losses due to rootknot nematode. Rootknot nematode is a problem for Chilli and eggplant too.

Management of these diseases are very difficult due to obvious reasons such as soil borne nature, wide host range, location

specific and vast genetic variability of the pathogen. There is no commercial pesticides available for sustainable control of these diseases. Use of resistant varieties is the most effective and simplest method of managing soil-borne diseases. But the resistant varieties are hardly available. Therefore, grafting could be one of the good options for the management of those diseases.

Grafting eggplant and tomato on resistant *Solanum* rootstocks proved effective for controlling bacterial wilt and root knot

nematode in some countries. *Solanum torvum* and *S. sisymbriifolium* are the promising rootstocks as reported in BARI, Bangladesh. *S. sisymbriifolium* is considered better source of resistant rootstock compared to *S. torvum*, because of shorter period for making seedling ready for rootstock. In inoculated conditions, none of grafted plants was infected



Wild eggplant, *S. sisymbriifolium*, resistant to Bacterial wilt and Rootknot nematode

whereas, non-grafted scion plants were infected. The yield also reported to be increased more than 30% with grafted plants in BARI, Bangladesh. In general, grafted plants yielded higher than non grafted plants in farmers' field in Bangladesh. Farmers in Bangladesh are successful

in cultivation of grafted tomato, eggplant and also capsicum.

Basically, exotic root stock varieties should be tested in local condition to confirm their resistance. It was found that *S. sisymbriifolium* was found to be resistant to bacterial wilt and rootknot nematode at Plant Pathology Division, Khumaltar conditions. Similarly, AVRDC has recommended eggplant genotypes EG 203 and EG 219 as rootstock for the control of bacterial wilt. During previous studies on resistance screening against bacterial wilt under SAVERNET program, in Nepal, those eggplant genotypes were found moderately resistant to resistant.

In our context, locally available wild *Solanum* plants should be explored and tested for resistant rootstocks such as, *S. xanthocarpum*. Preliminary test showed some wilt incidence in this plant but it should be further tested for confirmation and for the level of infection with bacterial wilt and rootknot nematode.



Tomato seedlings grafted in wild eggplant rootstock



Grafted Tomato plants at Khumaltar

Currently, research on testing plants for resistant root stocks, and disease reaction of the grafted plants under inoculated conditions are initiated with the development of infrastructure for grafting at Plant Pathology Division, Khumaltar. Moreover, for capacity building in this technology, two scientists and one Senior Technical Officer from NARC were recently trained in BARI, Bangladesh.

- Dr. Ram Devi Timila
Sr. Scientist (Plant Pathology)

NARC Scientist on media

NARC actively participate and contributes in regular print and electronic (radio, FM, TVs) media. NARC scientists/researchers also participate in interview in different media. Some of the interviews were as follow.

- Dr. Dhruva Thapa in Radio Nepal about “WK 1204, a yellow rust resistant wheat variety” on 9 October 2007.
- Mr. Bhola Man Singh Basnet in Radio Sagarmatha FM 102.4 about “27th World Food Day 2007” on 11 October 2007.
- Mr. Bhola Man Singh Basnet in Radio Nepal about “Wheat farming and food status in Nepal” on 25 October 2007.
- Dr. Madhusudan Prasad Upadhaya in Radio HBC FM 94 about “Gene Bank” on 9 November 2007.
- Dr. Madhusudan Prasad Upadhaya in Radio Sagarmatha FM 102.4 about “Gene Bank” on 16 November 2007.
- Dr. Madhusudan Prasad Upadhaya in Nepal Television about “Gene Bank” on 18 November 2007.
- Mr. Bhola Man Singh Basnet in Radio Star FM 90 about “NARC” on 21 November 2007.
- Mr. Bhola Man Singh Basnet in Radio HBC FM 94 about “Scientific Wheat farming” on 23 November 2007.
- Mr. Ram Chandra Munakarmi in Star FM Radio about “Soil test and its implication in agriculture” on 12 December 2007.
- Mr. Ghanashyam Malla and Mr. Bhola Man Singh Basnet in Radio BBC about “Climate change and agriculture prediction” on 17 December 2007.
- Dr. Buddhi Ratna Khadge in Radio Star FM 90 about “Mushroom Research” on 19 December 2007.

NARC Participated Agro-Fair

The National Maize Research Program (NMRP) and National Grain Legumes Research Program (GLRP), Rampur under Nepal Agricultural Research Council participated in Agro-Fair 2064 at Narayanghat in Chitwan District on 14-18 December 2007. The Fair was organized by Narayangadh Chamber of Commerce and Industry.

NARC Participated in Cottage Industries Festival

The Agriculture Engineering Division under Nepal Agricultural Research Council (NARC) participated in the Cottage Industries Festival-2007: A National Exhibition held at Bhrikuti Mandap, Kathandu on 6-10 December 2007. The Exhibition was organized by Federation of Nepal Cottage and Small Industries (FNCSI).

Talk Programs Held

- **Bio-fuels** by Dr. Murari Shyam, Project Coordinator, Central Institute of Agricultural Engineering, Bhopal, Madhya Pradesh, ICAR on 5 October 2007 at NARI Conference Hall, Khumaltar.
- **Agro-biodiversity** by Dr. Ravi Singh, FAO Consultant on 8 October 2007 at NARI Conference Hall, Khumaltar.
- **Conservation of Plant Biodiversity: An Indian Perspective** by Anurudh K Singh, FAO Consultant on 8 October 2007 at NARI Conference Hall, Khumaltar.
- **An Overview of the Influence of the Monsoon on Asia** by Prof. Dr. J.R.Jones, University of Missouri-Columbia, USA on 30 November 2007 NARC, Singhadurbar Plaza.
- **Overview of Indian Agricultural Research and Education System** by Dr. Raj Kumar Mittal, Principal Scientist and Assistant Director General, Indian Council of Agricultural Research (ICAR) on 11 December 2007 at Ministry of Agriculture and Cooperatives.
- **Carp Fish Improvement in Nepal** by Dr. Kanta Das Mahapatra, FAO Consultant and Senior Scientist, Central Institute of Fresh Water Aquaculture, Kausalyaganga, Bhubaneswor, Orissa, India on 23 December 2007 at Fishery Research Division, Godavari.

Director General of ILRI Visited NARC

Director General of International Livestock Research Institute (ILRI) Dr. Carlos Sere visited NARC on 4 October 2007. The Director General accompanied with two senior scientists visited NARC Headquarters and had interaction on mutual cooperation between the two institutions. NARC Executive Director, Dr. Nanda Prasad Shrestha gave highlights about NARC.

ILRI is a non-profit-making and non-governmental organization with headquarters in Nairobi, Kenya, and a second principal campus in Addis Ababa, Ethiopia. ILRI works at the crossroads of livestock and poverty, bringing high-quality science and capacity-building to bear on poverty reduction and sustainable development.

Visit of African Delegates

With an objectives of exchange of experiences and experimental learning within inter-continental framework, the African delegates of researchers and farmers had a visit to NARC on 4 October 2007. The team lead by Dr. Balma Didier, National Coordinator, TAG, INERA, Brukina Faso consisted Scientists and Farmers from Brukina Faso, Mali and Niger. The team observed the research activities plus Exhibit Room Learning Centre at Khumaltar. The visit was under the project on “Empowering Sahelian farmers to leverage their crop diversity assets for enhanced livelihoods” in Brukina Faso, Mali and Niger of West Africa with the support from IFAD, Rome.

The Delegates observed on-farm agro-biodiversity demo and also had interaction with Hon'ble Minister for Agriculture and Cooperatives plus high officials at MOAC.

Participation of NARC Scientists/ Researchers in Training/Workshop/Seminar/ Observation & Study Abroad

S.N.	Name	Position	Subject	Duration	Country
1.	Mr. Dev Prasad Sharma	S-4, Nat'l Rice. Res. Prog.	Hardinath, Rice breeding course	Oct. 1-12	Philippines
2.	Mr. Mathura Yadav	T-6, Nat'l Rice. Res. Prog.	Biometrics in agricultural research	Oct. 3-Dec.1	India
3.	Mr. Deokant Chaudhary	S-4, Ginger Res. Prog.	Learning program on safe vegetable production	Oct. 1-7	India
4.	Dr. Jwala Bajracharya	S-4, Agri-Botany Div.	Second annual meeting under ricebean project	Oct. 5-11	India
5.	Mr. Ram Chandrika Prasad	S-4, Hill Crops Res. Prog.	Second annual meeting under ricebean project	Oct. 5-11	India
6.	Dr. Adarsha Pradhan	Director, Livestock/Fish	Study visit and observation of Indian Veterinary Research Institute (IVRI) and National Dairy Research Institute	Oct. 8-9	India
7.	Mr. Shambhu Bahadur Panday	Director, NASRI	Study visit and observation of Indian Veterinary Research Institute (IVRI) and National Dairy Research Institute	Oct. 8-9	India
8.	Dr. Ram Pukar Thakur	S-4, Animal Health Res.	Seminar on animal health management for improving productivity, food safety & market access	Oct. 22-26	Thailand
9.	Mr. Shreemat Shrestha	S-4, Ag. Engineering Div.	International seminar on enhancing of conservation agriculture techniques in Asia & the Pacific	Oct. 24-26	China
10.	Dr. Hari Prasad Bimb	Chief, Biotech Unit	Harvest plus rice crop team/biofortification meeting	Nov. 3-5	Thailand
11.	Mr. Ravi Rasaili	T-6, Ag. Engineering Div.	Data collection training-cum-field visit	Nov. 12-13	India
12.	Dr. Sribaba Pradhan	Chief, Entomology Div.	Strategies for chemical management	Nov. 12-16	Vietnam
13.	Mr. Yagya Prasad Giri	S-4, Entomology	Strategies for chemical management	Nov. 12-16	Vietnam
14.	Mr. Ram Nath Jha	S-1, RARS, Tarahara	International Training and Research Course	Nov. 13-31	India
15.	Mr. Binesha Man Sakha	S-4, Potato Res. Prog.	In vitro and cryopreservation techniques for conservation of plant genetic resources	Nov. 14-29	India
16.	Dr. Sitaram Aryal	S-4, Animal Health Res.	Avian Influenza of poultry culture	Nov. 16-5 Dec.	India
17.	Mr. Srikrishna Adhikary	Director, NARI	APCAEM Third session of the Technical Committee and Governing Council	Nov. 20-23	China
18.	Dr. Nanda Prasad Shrestha	Executive Director	The regional meeting on "Towards a joint regional agenda for the alleviation of poverty through agriculture and secondary crop development"	Nov. 21-22	Thailand
19.	Dr. Chet Raj Upreti	Chief, Animal Nutrition Div.	Rejuvenation of forests with Fodder Trees and Shrubs to sustain goat production in the hills of Nepal	Dec. 2-24	Israel
20.	Mr. Shambhu Bahadur Panday	Director, NASRI	Rejuvenation of forests with Fodder Trees and Shrubs to sustain goat production in the hills of Nepal	Dec. 2-24	Israel
21.	Dr. Tek Bahadur Gurung	Chief, Fishery Res. Div.	Sustainable poverty reduction in land-locked himalayan countries through development of year-round carp production in hydropower tail water	Dec. 5-17	Norway
22.	Mr. Ram Krishna Neupane	Director, RARS-Nepalgunj	Project launching meeting on IFAD Grant	Dec. 12-13	India
23.	Mr. Surendra Prasad Sriwastav	Coordinator, Legumes Res.	Project launching meeting on IFAD Grant	Dec. 12-13	India
24.	Mr. Ram Narayan Chaudhary	Co-ordinator, Oilseed Res.	Project launching meeting on IFAD Grant	Dec. 12-13	India
25.	Mr. Raj Kumar Niroula	S-1, Biotech. Unit	Ph. D. in Bio technology	Aug 24. - Aug. 6, 2010	Italy
26.	Mr. Dinesh Adhikari	S-1, Soil Science Div.	Ph.D. in Soil science.	Oct 1-March 31, 2012	Japan

Source: Training and Scholarship Division, NARC

Increased Rice and Vegetable Production Through Solarization

Healthy roots are vital for vigorous plant growth and high yields. Roots damaged by soil-borne pathogens will not take up nutrients or water efficiently and make crops more susceptible to adverse biophysical conditions (drought, heat, floods, nutrient deficiencies). Root-knot nematode (*Meloidogyne graminicola*), *Bipolaris*, *Sclerotium*, *Fusarium*, *Rhizoctonia* and *Pythium* are a few of the important root pests and pathogens effecting rice and vegetables in South Asia. Yield losses of at least 20-25% have been reported from these organisms.



Fig.1. Farmers' Adoption

Chemical control is rarely used, because of high cost, unavailability of chemicals, health concerns and lack of farmer knowledge. Soil solarization is a non-chemical method of soil treatment where solar radiation is trapped, thereby heating the soil. Transparent polythene plastic (250-300 gauge) is placed on top of moist soil and left at least 2-3 weeks. Depending on location it can be done from March to May or August and September immediately after monsoon rains cease. Solarization increases the soil temperature to 40-58°C under the plastic and kills soil-borne pathogens and pests (especially *Meloidogyne graminicola*) to produce healthy and weed free seedlings. It improves root health, produces healthy, vigorous seedlings at a low cost (about Rs.700-800 per ha).

We have found that solarization of nursery seedbeds increases rice yields as much as 25% and even more in vegetable and flowers (up to 100%). Solarization also is very useful in the System of Rice Intensification (SRI) for growing healthy and vigorous young seedlings. Results indicate that SRI with solarization can increase rice yields by 6-30% compared to SRI

with non-solarized seedlings. Soil Management Collaborative Research Support Program (SMCRSP) through the USAID funded project have disseminated this technology to CARE,

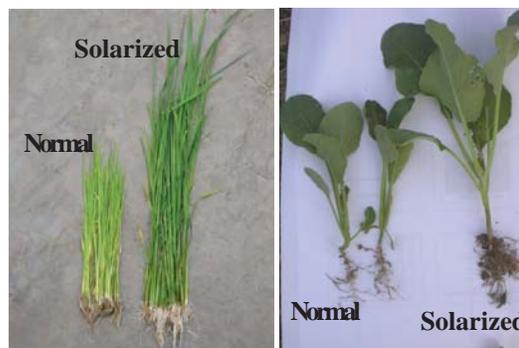


Fig. 2. Normal Seedling and Solarized Seedlings of Rice and Cauli from Adjoining Seedbeds

ADO Morang, Winrock SIMI, FORWARD and Educate the Children as well as the Nepal IRRI Rice Knowledge Bank. The impacts of solarization have been quite positive and more farmers are adopting it for the improved food security and livelihood benefits.

- C Adhikari, SMCRSP

NATIONAL CROP STATISTICS

Preliminary Estimates of Summer Crops 2007/08

Crop	Area (ha)	Production (mt)	Productivity kg/ha
Rice	15,49,262 (7.62)	42,99,246 (16.80)	2,775 (8.53)
Maize	8,70,166 (-0.03)	18,78,648 (3.23)	2,159 (3.25)
Finger millet	2,65,496 (0.13)	2,91,098 (2.21)	1,096 (2.08)

Figures in parenthesis indicate the percentage growth as compared to last fiscal year.

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