

Evolution of Cereals and Legumes Asia Network to meet Regional Challenges in Asia¹

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Introduction

The Cereals and Legumes Asia Network (CLAN) was formed in 1992 by merging the erstwhile Asian Grain Legumes Network (AGLN) and the Cooperative Cereals Research Network (CCRN). CLAN's overall goal is to improve the well-being of Asian farmers and consumers by improving the productivity and sustainable production of sorghum, pearl millet, chickpea, pigeonpea and groundnut.

The sixth CLAN Steering Committee Meeting held in December 1999, marked the termination of the 12-year period of funding support from the Asian Development Bank. At that meeting, member countries agreed to continue network research and development activities with funding from national programs. APAARI and ICRISAT were requested to provide support funding for coordination, capacity building and exchange of genetic materials and information. APAARI has provided limited funding support, augmenting ICRISAT's contribution, which is derived both from core funding and from bilateral and multilateral projects.

Objectives

- Strengthen linkages and enhance exchange of germplasm, breeding material, information and technology.
- Facilitate collaborative research to address high-priority production constraints, with emphasis on poverty and equity issues.
- Assist in improving the research and extension capability of member countries through human resource development.
- Enhance coordination of regional research development and technology exchange involving sorghum, pearl millet, chickpea, pigeonpea and groundnut.
- Contribute to the development of stable and sustainable production systems through a responsive research capability in member countries.
- Ensure that research knowledge and products developed by CLAN are actively disseminated, adopted and utilized by Asian farmers.

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Partners

CLAN includes 13 member countries. It also includes interested regional and international research institutions in Asia, and responds to non-member Asian countries depending on need and interest. Following are the major partner organizations in member countries.

1. *Bangladesh*. Bangladesh Agricultural Research Council, Dhaka
2. *China*. Chinese Academy of Agricultural Sciences, Beijing
3. *India*. Indian Council of Agricultural Research, New Delhi
4. *Indonesia*. Central Research Institute for Food Crops, Bogor
5. *Iran*. Agricultural Research Education and Extension Organisation, Teheran
6. *Myanmar*. Myanma Agriculture Service, Yangon
7. *Nepal*. Nepal Agricultural Research Council, Katmandu
8. *Pakistan*. Pakistan Agricultural Research Council, Islamabad
9. *Philippines*. Philippine Council for Agriculture, Forestry and Natural Resources Research and Development, Los Baños
10. *Sri Lanka*. Department of Agriculture, Peradeniya
11. *Thailand*. Department of Agriculture, Bangkok
12. *Vietnam*. Ministry of Agriculture and Rural Development, Hanoi
13. *Yemen*. Ministry of Agriculture and Resources, Dhamar

Major Network Activities

- Facilitating collaborative in-country research based on capability and needs of the national programs, targeted toward generating technologies for adoption by farmers.
- Strengthening crop improvement programs through exchange of germplasm and breeding material to build viable breeding programs within the national agricultural research systems (NARS).
- Conducting farmer-participatory on-farm adaptive research to enhance technology adoption.
- Sharing information and knowledge among member countries, using traditional and new information and communication technology (ICT).
- Building the capacity of NARS research and development programs through tailored learning-by-doing programs.

- Convening regional workshops and meetings to exchange research results and information, and to develop collaborative research plans.
- Forming working groups (consortia) to address high-priority regional production constraints. Current working groups include Bacterial wilt of groundnut, Botrytis gray mold of chickpea, Aflatoxin management in groundnut and Nitrogen-fixing legumes in Asia.
- Supporting exchange visits between ICRISAT and NARS and among NARS for enhancing interaction, information exchange and research collaboration.
- Supporting execution of special bilateral and multilateral research and development projects.

APAARI support to CLAN

APAARI provided ICRISAT with US\$ 15,000 in 2001 and US\$ 16,000 in 2002 to support CLAN. The funds were utilized for exchange of germplasm and breeding material; training of NARS scientists (both in-country and at ICRISAT); and exchange of scientist visits and participation in meetings and workshops.

Network activities, 2000-03

- *Supply of germplasm and breeding material.* During 2000-03, ICRISAT supplied the following to member countries (Table 1).
 - 29,041 germplasm accessions
 - 55,008 breeding lines
 - 518 sets of trials/nurseries
- *Varieties release.* Using ICRISAT material, member countries released 39 varieties (3 sorghum 11 pearl millet, 14 chickpea, 1 pigeonpea, 9 groundnut and 1 barnyard millet [Table 1]).
- *Support regional projects.* Special bilateral and multilateral research and development projects were facilitated.
- *Training.* Fifty training courses were organized to impart training on special skills and new methods and technologies to NARS scientists: 631 NARS staff participated and enhanced their capabilities.
 - 231 research fellows
 - 94 research scholars
 - 7 in-service trainees,
 - 299 apprentices
- *Exchange visits.* Ninety-two scientists from ICRISAT made 159 visits to Asian countries (other than India), and spent 1830 days assisting NARS scientists. Seventy NARS scientists made 46 visits to ICRISAT (or

ICRISAT-supported) meetings and workshops and spent 538 person days working on research and development activities.

Impact

The following is a sample of significant impacts from network activities.

- *Breeding material.* A significant proportion of breeding material in the Asian NARS is of ICRISAT origin. In Maharashtra, India, 89% of surveyed farmers had adopted downy mildew-resistant, high-yielding pearl millet varieties developed by ICRISAT, or by Indian NARS using breeding lines supplied by ICRISAT.
- *Varietal adoption.* Two improved, early-maturing varieties of chickpea were adopted in Andhra Pradesh, India: ICCV 2 (Swetha) and ICCV 37 (Kranti). Chickpea production increased from 20,000 t in 1990 to 140,000 t in 1998, and productivity from 400 kg ha⁻¹ to 800 kg ha⁻¹. Chickpea has replaced cotton on many farms because it is more profitable.
- *Impact of chickpea in Andhra Pradesh.* A study conducted in five districts of Andhra Pradesh found that ICRISAT varieties occupy 33% of the area under chickpea in the three districts of Guntur, Prakasam and Cuddapah. In Cuddapah, farmers who adopted ICRISAT varieties pocketed Rs 2658 per hectare more than farmers planting the ruling variety, Annigeri.
- *Pigeonpea in Nepal.* Production doubled from 9000 t in 1988 to 18,000 t in 1998 as a result of adoption of disease-resistant varieties and improved crop management.
- *Groundnut in Vietnam.* Since 1990, the area sown to groundnut increased from 201,400 ha to 259,000 ha (in 1998), production from 0.21 million t to 0.37 million t (in 1998), and yield from 1.04 t ha⁻¹ to 1.61 t ha⁻¹ (in 2002). This increase resulted from sowing improved varieties and from applying improved crop management technologies using low-cost inputs.
- *Winter-sown groundnut in Vietnam.* A combination of high-yielding varieties and polythene mulching enhanced pod yields in winter-sown groundnut in northern Vietnam. This technology has spread quickly throughout the area.
- *Chickpea in the Barind.* About 0.8 million ha in the Barind region of Bangladesh traditionally lies fallow after the rice harvest. Adoption of a short-duration, high-yielding chickpea variety (Nabin) in this region has given farmers a reliable postrainy-season crop. The area sown to chickpea has increased from less than 1,000 ha in 1985 to over 22,000

ha in 2002. Farmers now grow a second crop. This technology alone adds US\$ 5 million to the country's gross domestic product.

- *Chickpea in Myanmar.* Five improved short-duration chickpea varieties have been adopted by farmers in Myanmar over an estimated area of more than 20,000 ha. The area under these varieties increased tenfold from 1,000 ha in 1995 to 200,000 ha in 2002.
- *Kabuli chickpea in Myanmar.* Extra-short-duration kabuli chickpea ICCV 2, released as Yezin 3 in Myanmar, has become the preferred variety by farmers, whose lives have been changed for the better in the central dry areas of the country. There are four reasons for Yezin 3's immense popularity.
 - It escapes terminal drought due to early maturity.
 - Because it is a kabuli type, it fetches much higher prices in the market than the traditional desi types.
 - It matures early (85 days).
 - It is resistant to fusarium wilt.

Expanding the CLAN mandate

Because food legumes are considered secondary crops, they often receive insufficient local funding for research and development. Concern has been expressed at various regional forums for the need for regional coordination of research and development, with technical backstopping from international research centers and strong NARS in Asia-Pacific region. APAARI took the initiative and debated the issue at the third APAARI Executive Committee Meeting, held 3 February 1996 at New Delhi, and recommended that CLAN should be expanded to include other major legumes.

The strongest recommendation for concerted regional effort to facilitate regional research and development of major food legumes was made at the APAARI General Assembly Meeting at Penang, Malaysia, 2-4 December 2002. The Assembly recommended that lentil (mandate crop of the International Center for Agricultural Research in the Dry Areas, ICARDA) and mungbean (mandate crop of the Asian Vegetable Research Development Center, AVRDC) should be included in CLAN activities. It was suggested that ICRISAT, ICARDA and AVRDC provide the necessary technical and financial backstopping to CLAN. APAARI also indicated its willingness to support to the network by financing coordination and capacity building in APAARI member countries.

The three international agricultural research centers, AVRDC, ICARDA and ICRISAT, agreed to this request, and along with APAARI representative attended a CLAN Steering Committee Meeting at ICRISAT 10-12 November 2003. CLAN Country Coordinators participating in the meeting came from Bangladesh, China, India, Indonesia, Iran, Myanmar, Nepal, Philippines, Sri

Lanka, Thailand and Vietnam. The CLAN Steering Committee endorsed the decision of APAARI to include lentil and mungbean as additional crops of the CLAN for regional coordination, and amended the constitution to accommodate additional crops and activities, and to include other international centers as partners.

The enlarged CLAN will be co-facilitated by ICRISAT, ICARDA, and AVRDC. It was also decided that ICRISAT would continue to act as the nodal institution and host of the CLAN Coordination Unit, in consultation with international partner institutions.

The Steering Committee reviewed the status and role of legumes in crop diversification and poverty reduction in the cereal-based cropping systems of Asian countries, and prepared a project proposal called *Improving income and nutrition by enhanced grain legumes production in the cereals-based cropping systems of Asia*. This initiative was also endorsed by the Rice-Wheat Consortium for the Indo-Gangetic Plains.

Future

CLAN has been a successful network in the Asia region. It has become a model for research collaboration among NARS and has contributed to strengthening the capacity of NARS to conduct research and development in Asia. The November 2003 meeting at ICRISAT-Patancheru was a milestone, as it laid the foundation for an innovative approach for regional coordination of research and development that involves the regional forum (APAARI), three IARCs (AVRDC, ICARDA and ICRISAT) and the NARS of CLAN member countries. Thus, the seeds have been sown for a unique institutional mechanism to enhance food security, improve livelihoods and sustain agricultural systems in Asia through partnership.

The APAARI General Assembly Meeting held at Penang, Malaysia, in December 2002 challenged us to create a “new CLAN” before requesting additional support. We have kept our promise. We are therefore requesting APAARI to provide US\$ 30,000 for the network activities during 2004 (Table 4).

Table 1. Details of germplasm and breeding material supplied to NARS and varieties released by Asian countries, 2000-03.

Crop	Germplasm accessions	Breeding Lines	Trials	Nurseries	Varieties released
2000 - Sorghum	803	5486	17	-	2
- Pearl Millet	1034	3139	-	20	2
- Chickpea	748	1092	-	81	8
- Pigeonpea	1097	339	18	-	0
- Groundnut	1540	465	34	-	0
- Small millets	42	-	-	-	0
2001 - Sorghum	2265	3884	23	25	0
- Pearl Millet	201	15379	18	16	2
- Chickpea	2941	2025	-	-	2
- Pigeonpea	1217	308	-	-	0
- Groundnut	860	668	14	-	2
- Small millets	6810	-	-	-	0
2002 - Sorghum	1636	10171	20	4	1
- Pearl Millet	411	2862	33	2	3
- Chickpea	1030	748	-	71	2
- Pigeonpea	2382	461	25	-	0
- Groundnut	292	168	17	-	6
- Small millets	687	-	-	-	0
2003 - Sorghum	391	2219	31	5	0
- Pearl Millet	574	2021	9	15	4
- Chickpea	576	3167	-	70	2
- Pigeonpea	435	266	15	-	1
- Groundnut	926	140	21	-	1
- Small millets	143	-	-	-	0
Total - Sorghum	5095	21760	91	34	3
- Pearl Millet	2220	23401	60	53	11
- Chickpea	5295	7032	-	222	14
- Pigeonpea	5131	1374	58	-	1
- Groundnut	3618	1441	-	-	9
- Small millets	7682	-	-	-	1

Table 2. Training and skill development of scientists and technicians from Asia, 2000-03.

Year	Training courses	NARS staff	Research Fellows	Research scholars	In-service trainees	Apprentices
2000	6	165			7	45
2001	10	102			-	69
2002	25	150			-	85
2003	9	214	95	19	-	100
Total	50	631	231	94	7	299

Table 3. Exchange of Scientists visits and participation in Scientific meetings, 2000-03.

Year	No. of Scientists		No. of Visits		No of days spent	
	ICRISAT	NARS	ICRISAT	NARS	ICRISAT	NARS
2000	22	19	41	13	399	275
2001	20	30	36	24	484	187
2002	31	13	50	5	550	59
2003	19	8	32	4	397	17
Total	92	70	159	46	1830	538

Table 4. Suggested contribution of funds from APAARI for CLAN activities during 2004.

Sl. No.	Line Item	Amount (US\$)
1	Training at IARC ¹	10,200
2	In-country training ²	6,000
3	Scientist Exchange Visits & Meetings ³	9,000
4	Partial support to Coordination Unit	4,800
Total		30,000

¹ Training of 6 NARS staff at US\$ 1,700 each for 2 weeks.

² In-country training in six countries at US\$ 1,000 each country.

³ Cost of exchange visits of scientists among countries and partial support to participate in international conferences and symposia.