**Recommendations of the Workshop**

A survey was conducted with a very brief questionnaire to all the participants of the workshop. The objective of the survey is to determine the future research and development needs for mungbean and to ascertain the constraints to promotion of improved mungbean varieties in the Indo-Gangetic Plains of South Asia with emphasis on Bangladesh, India and Nepal. The participants came up with the following recommendations:

1. Varietal development and agronomic research on mungbean should focus on extra short duration varieties and resource conserving environment friendly management technologies that will reduce cost of production.

2. Among the biotic constraints, in-depth research is most needed on mungbean yellow mosaic virus (MYMV) and pod borer. Research should focus on durable resistance, marker-assisted selection, and diversity of virus strains. In addition to MYMV, studies on *Cercospora* leaf spot, root disease complex, and powdery mildew resistance are also important. In addition to pod borer, studies on whitefly and weevil control are also needed.

3. Yield potential in farmer’s field should be stabilized and enhanced. Constraints to stable and high yield should be carefully evaluated and solutions for the same should be identified.

4. Agronomic research should focus on location- and season-specific management practices that can enhance yield, reduce cost of production, sustain soil productivity, and conserve the environment.

5. Efforts should be made to develop improved cultivars that can withstand drought and adverse weather conditions for use in marginal, dry and semi-arid situations.

6. The need to have further socio-economic and marketing research was emphasized. The farmer’s organization was concerned with the unstable and low prices for mungbean. Therefore, the government should come up with positive policy guidelines and guarantee prices for mungbean, which will stimulate and encourage farmers to diversify the rice-wheat system with mungbean. Without government policy and price support system, farmers may be reluctant to change even though the yield is attractive and crop duration is short and optimized for adoption by farmers in the region.
7. Farmers and consumers prefer large shiny seeds for the market since they fetch a premium price. Therefore, new varieties to be produced should be bold and shiny.

8. Uniform maturity is attractive and desirable for the farmers in crop diversification since they can use machines to harvest the crop. Therefore, varieties with synchronized maturity are preferable.

9. The Seed Village Program is excellent and it should be extended to other countries.

10. The dramatic expansion of area and production of mungbean in Punjab and Bangladesh should be extended to poor states such as Bihar and Rajasthan and to the poor farmers in Nepal.

Prepared by
S. Shanmugasundaram
and Katinka Weinberger
Appendix 1. Acronyms

Ai adoption index
AICPIP All India Coordinated Pulses Improvement Project
AICRP All India Coordinated Research Programme
AMVT Asian Mungbean Varietal Trials
ANOVA analysis of variance
APP agriculture perspective plan
ARA acetylene reduction activity
AVRDC Asian Vegetable Research and Development Center-
The World Vegetable Center
AVT advanced varietal trial
BADC Bangladesh Agricultural Development Corporation
BARI Bangladesh Agricultural Research Institute
BINA Bangladesh Institute of Nuclear Agriculture
BLS Bacterial Leaf Spot
BMI Body Mass Index
BNF biological nitrogen fixation
BSMRAU Bangabandhu Sheikh Mujibur Rahman Agricultural University
BT Baby Trials
CAZS Centre for Arid Zone Studies
CIMMYT International Maize and Wheat Improvement Center
CLS *Cercospora* leaf spot
CVRC Central sub committee on crop standards, notification and release of variety
DAA day after anthesis
DADOs District Agriculture Development Offices
DAE Department of Agricultural Extension
DAP Diammonium phosphate
DFID Department for International Development
DM dry matter
FLD front line demonstrations
FORWARD Forum for Rural Welfare and Agricultural Reform for Development
FPP Full Package of Practice
HAS hours after sowing
HAU Haryana Agricultural University
IARC International Agricultural Research Centers
IARI Indian Agricultural Research Institute
ICRISAT: International Crops Research Institute for the Semi-Arid Tropics
IFFCO: Indian Farmers Fertilisers Cooperative Limited
IGP: Indo-Gangetic Plains
IMN: International Mungbean Nursery
IRD: Informal Research and Development
KAP: knowledge, attitude and practice
*Kharif*: rainy season
*Kharif I*: March-May
*Kharif II*: August-November
LBMDPP: Lentil, Blackgram Mungbean Development Pilot Project
LI-BIRD: Local Initiatives for Biodiversity Research and Development
Mo: Molybdenum
MPN: Most Probable Number
MT: Mother Trials
MYMV: mungbean yellow mosaic virus
N: nitrogen
NARC: Nepal Agricultural Research Council
NBPGR: National Bureau of Plant Genetic Resources
NGLRP: The National Grain Legumes Research Programme
NIAB: Nuclear Institute for Agriculture and Biology
NIFA: Nuclear Institute for Food and Agriculture
NPK: Nitrogen/Phosphorus/Potassium
NRRP: National Rice Research Program
NSC: National Seed Corporation
NWFP: Northwest Frontier Province
NWFPAU: Northwest Frontier Province Agricultural University
NWPZ: north west plain zone
P: phosphorus
PAU: Punjab Agricultural University
PGPR: plant growth promoting rhizobacteria
PSB: phosphate solubilizing bacteria
PSSC: Punjab State Seeds Corporation
PSSCA: Punjab State Seed Certification Authority
PUNSEED: Punjab State Seed Corporation
Pusa Vishal: Pusa Bold
PVS: participatory varietal selection
R: *Rhizobium*
*Rabi*: winter
RCBD: Randomized Complete Block Design
RDA: recommended dietary allowances
RDI: recommended dietary intakes
RF recommended fertilizer
RH relative humidity
S sulphur
SAR Systemic Acquired Resistance
SAVERNET South Asian Vegetable Research Network
SFCI State Farm Corporation of India
SSCs State Seeds Corporations
SSP single super phosphate
STL Seed Testing Laboratory
SVAC State Variety Approval Committee
SVP Seed Village Programme
TNAU Tamil Nadu Agricultural University
TR traditional preparation
U.P. Uttar Pradesh
UPGMA unweighted pair group method analysis
WHO World Health Organization
YEMA yeast extract mannitol agar
Under the umbrella framework of South Asia Vegetable Research Network (SAVERNET), a mungbean subnetwork was initiated in March 1997. The Department for International Development (DFID) of U.K. approved a three-year Holdback Project R6719 (H), “Promotion of Mungbean Research Outputs for Farmer Adoption in South Asia”. A total of 31 promising cultivars from the six participating South Asian countries (Bangladesh, Bhutan, India, Nepal, Pakistan and Sri Lanka) and AVRDC were pooled together for conducting uniform trials. The project conducted trials in 16 strategic locations in Bangladesh, Bhutan, India, Nepal, Pakistan and Sri Lanka for two seasons in 1998 and 1999. From the results of the trials, Bangladesh, Pakistan and India have identified cultivars that are resistant/tolerant to mungbean yellow mosaic virus (MYMV) and yield 2 t/ha in 55–65 days after sowing. Bhutan and Sri Lanka identified cultivars with more than 2 t/ha in the absence of MYMV. The Indian Agricultural Research Institute and G.B. Pant University of Science and Technology in India have officially released NM-92, NM-94 and VC 6368 as Pusa Vishal, SML 668 and Pant Mung 5, respectively. Bangabandhu Sheik Mujibur Rahman Agricultural University in Bangladesh has released VC 6372(45-8-1) as BUmug 1 and VC 6370(30-65) as BUmug 2. Bangladesh Agricultural Research Institute has released NM-92 as BARImung 5.

DFID recognized the potential of the above short maturity duration (55–65 days), MYMV resistant, synchronously maturing, bold seeded, high yielding mungbean cultivars for diversifying the Rice Wheat Cropping System (RWC) for millions of small farmers in the Indo-Gangetic Plains of South Asia (specifically Bangladesh, India and Nepal). They approved a two-year project in March 2002, “Improving Income and Nutrition by Incorporating Mungbean in Cereal Fallows in the Indo-Gangetic Plains of South Asia”.

**Project Goals**

- Improved rural household income and employment opportunities, increased nutritional security and diversified healthy diets through increased availability of mungbean for the poor in the Indo-Gangetic Plains
- Enhanced soil fertility for 500,000 farmers in the Indo-Gangetic Plains of South Asia
**Project Objectives**

- Farmers in the Indo-Gangetic Plains adopt and integrate MYMV resistant/tolerant, short duration mungbean cultivars in RWCs for diversification and sustainability of the cereal-based cropping system.
- Collaborating national agricultural research systems (NARS) utilize AVRDC’s improved mungbean germplasm and methodologies for location-specific adoption, considering socio-economic conditions and constraints of farmers in the Indo-Gangetic Plains.
- Mungbean consumption in South Asia is promoted for improved diets.

**Research Activities**

1. Socio-economic analysis
2. Cultivar identification
3. Technology packages development
4. Evaluation of the effect of mungbean on cereals
5. Determination of water use efficiency
6. Seed production and distribution
7. Recipes development
8. Impact assessment

The outputs of the above activities will be presented and discussed. Participants will also discuss a follow-up plan for the next two years to expand the area and production of mungbean and to conduct research to overcome the constraints.
## Appendix 3. Workshop Program, 27-31 May 2004

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<tr>
<td></td>
<td>S. Shanmugasundaram, DDG-R/ AVRDC</td>
</tr>
<tr>
<td></td>
<td>Keynote address</td>
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<tr>
<td></td>
<td>G. Kalloo, DDG (Hort. &amp; CS)/ ICAR</td>
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<tr>
<td></td>
<td>Address by Chief Guest</td>
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<tr>
<td></td>
<td>Thomas A Lumpkin, DG, AVRDC</td>
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<td>Presidential remarks</td>
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<tr>
<td></td>
<td>K.S. Aulakh, VC/PAU</td>
</tr>
<tr>
<td></td>
<td>Vote of thanks</td>
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<tr>
<td></td>
<td>M.S. Tiwana, Dean, College of Agriculture, PAU</td>
</tr>
<tr>
<td>1000-1030</td>
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<td><strong>Reporteur: George Kuo</strong></td>
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<tr>
<td>1100-1120</td>
<td>Development of short duration mungbean cultivars for rice-based cropping systems in Bangladesh</td>
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<td></td>
<td>Md. Moynul Haque</td>
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<tr>
<td>1120-1140</td>
<td>Research on agronomic practices for mungbean in rice-based cropping system in Bangladesh</td>
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<td>Abdul Hamid</td>
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<tr>
<td>1140-1200</td>
<td>Effect of mungbean on the productivity in rice-wheat cropping system</td>
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<td></td>
<td>Abdul Hamid</td>
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<tr>
<td>1200-1220</td>
<td>Mungbean diseases and pests incidence and their management</td>
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<tr>
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<td>Md. Abu Bakr</td>
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<tr>
<td>1220-1240</td>
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<tr>
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<tr>
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<td>Discussion</td>
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<td>1500-1530</td>
<td>Coffee break</td>
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<tr>
<td>1530-1550</td>
<td>Developing short duration mungbean genotypes suitable for rice-wheat cropping system</td>
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<td>1550-1610</td>
<td>Agronomic management in mungbean grown under different environments</td>
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<td>Status of mungbean yellow mosaic virus resistance and characterization of viral strains by DNA markers</td>
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<td>1630-1650</td>
<td>Insect pest management of mungbean</td>
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<td>1650-1710</td>
<td>Status of production and distribution of mungbean seed in different cropping seasons</td>
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<td>0810-0830</td>
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<td>0910-0930</td>
<td>Discussion</td>
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<td><strong>Session IV. Final Report – Nepal and others</strong></td>
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<tr>
<td></td>
<td><strong>Co-Chairmen: Abdul Hamid and Raj K Gupta</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Reporteur: Dr. Gurdip Singh</strong></td>
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<tr>
<td>0930-0950</td>
<td>Testing promotion of mungbean in cereal fallows in the low hills and</td>
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<td>terai agroecosystem of Nepal</td>
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<td>1010-1030</td>
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<td><strong>Chairman: David Harris</strong></td>
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<td><strong>Reporteur: Katinka Weinberger/D.K.Grover</strong></td>
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<tr>
<td>1120-1300</td>
<td>Interaction and discussion with mungbean growing farmers</td>
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### Session VI. Opportunities for Mungbean Expansion

**Chairman:** K.D. Joshi  
**Reporteur:** H.S. Sekhon

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<td>P.K. Jaiwal</td>
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<td>Perspectives of RWC on the potential of mungbean in the rice-wheat system</td>
<td>Raj K. Gupta</td>
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<td>1600-1620</td>
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### Session VII. Proposed Workplan 2004–2006

**Chairman:** Thomas A. Lumpkin  
**Reporteur:** S. Shanmugasundaram

<table>
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<tr>
<td>1730-1800</td>
<td>Closing remarks</td>
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<tr>
<td>1930-</td>
<td>Farewell dinner</td>
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</tbody>
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**Day 4 – 30 May 2004 (Sunday)** Field trip to PAU farms and farmers’ fields

**Day 5 – 31 May (Monday)** Departure for participants
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