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EXECUTIVE SUMMARY

Realizing the felt need for the interface between public and private sectors for enhancing the adoption and spread of public-bred hybrids/varieties by increasing the availability of pure seed stocks of parental lines to private seedsmen, who would further produce and distribute quality F1 seeds to farmers, Indian Foundation Seed and Services Association (IFSSA) was established by visionaries Dr B.R. Barwale and Dr Wayne H. Freeman. The major activities for the period ending March 31, 2008 are listed below:

- IFSSA is serving as an efficient interface between public and private seedsmen on public-private partnership mode
- IARI-IFSSA model on the lines of public private partnerships has emerged as pioneering and successful model in the field of agriculture. it was well appreciated by Hon'ble Union Minister for Agriculture as well accepted by seed industry.
- IFSSA has been undertaking maintenance breeding, multiplication and distribution of parental line seeds of promising public bred hybrids
- IFSSA supplied quality seeds of parental line seeds of promising rice hybrids to both public institutes and private companies
- IFSSA offered molecular marker services for genetic purity tests and marker assisted selection (MAS) for private seed companies
- A total of 26 members from both public (01) and private (25) seedsmen, which comprised of institutional (9) and associate (17) members have been enrolled till now
- IFSSA aims at popularizing public bred promising hybrids by systematic maintenance breeding, pure seed stocks of parental lines, demonstration of seed production technologies and relevant development activities

In its journey for almost three years IFSSA has carved a niche in the Indian seed market and it is becoming essential component of it. Over the years it has stood for quality and timely services and still growing with the same promise. In order to achieve the national objective of diversification in agriculture, there is a greater need to address the timely availability of quality seeds and adoption of promising public bred hybrids/varieties of other crops. IFSSA has so far being dealing with rice and pearl millet, now ready to expand its role in other crops too.



About IFSSA

Indian Foundation Seed and Services Association (IFSSA) established on June 14, 2005, is a Non-Profit Organization registered under section 25 of the Companies Act, 1956. IFSSA is currently supported by the Barwale Foundation (BF), a non-profit philanthropic research-driven foundation striving for the public good.

The systematic agricultural research and development has crossed a history of century by the year. Initially, the entire R&D set-up and its' progress was solely shouldered by the public sector agencies like SAUs, ICAR, NSC and state SSCs etc. However, the role of private agencies became popular and supported by the Government since 1988 through its' new seed policies which enabled the private sector to utilize the research products of public sector for further popularization and commercialization. Due to exhaustive strengths in the areas of multi-disciplinary manpower, infrastructure, extension and planning, public sector developed several promising technologies. Development of hybrid varieties in maize, sorghum, bajra, rice etc is one of such milestones. Private seedsmen have been successfully commercializing them by multiplying the hybrid seeds and making available to the farmers. With the ever-increasing cost of research inputs and under the aegis of new pant variety protection, public sector research agencies wish that their research be well rewarded and remunerated. Though the first rice hybrid was released in 1996-97 in India, and today there are abundant rice hybrids developed by the public sector agencies, they could not make a dent, hence are not aptly popularized and adopted. At the same time, private sector could develop and popularize a countable number of rice hybrids. One of the shortcomings for the poor spread and adoption of public bred rice hybrids in the country is due to lack of quality parental line seeds to produce quality hybrid seeds, which is otherwise is due to poor and inappropriate maintenance breeding and seed supply chain/systems. Indian seed industry constitutes of huge number of small and marginal scale seedsmen who might not afford their own R&D but could produce the seeds of public bred hybrids and make available to farmers.

These observations compelled the visionaries like Dr B.R. Barwale, the father of Indian Seed Industry and Dr Wayne H. Freeman, an important member of Rockefeller Foundation team during 1960s to India and well-wisher of Indian Seed Industry, to analyze the ground realities, conceptualize the modus operandi and develop an effective interface for bridging the gaps between public sector research, private seed sector and Indian farming communities on the mode of private-public partnership.

This ultimately and logically resulted in the establishment of IFSSA, who would enter into Memorandum of Agreement (MoA or MoU) with public sector research institutes, obtains the nucleus/breeder seeds, maintain, multiply foundation seeds (seeds of parental lines) and make available quality parental line seeds of promising public-bred varieties/hybrids to seedsmen who would further produce commercial quality hybrid seeds and distribute to farmers.



IFSSA staff in discussion with Dr Wayne H. Freeman

One of the pertinent limitations is non-availability of assured genetically pure seeds. The quality of hybrid seeds is conventionally assessed by field grow-out test (GOT) based on morphological descriptors which are time consuming, tedious and subjective. The results of the GOT used to make both the seed grower and seed companies to wait for atleast 3-4 months for getting payment and selling the seeds in market, respectively. However, the applications of molecular markers for genetic purity tests made the seed purity assessment much rapid, simpler and reliable. IFSSA is devised as one of the institutes to offer genetic purity assessment services to seedsmen.

The application of molecular markers enhanced the pace of plant breeding schemes as they assist breeder for quick and reliable screening of breeding populations for the gene of interest and thus, shortens the breeding programmes. Dr. Barwale and Dr. Freeman wished that through IFSSA, such technologies should be made available to seedsmen who might not afford exorbitant R&D infrastructure but wish to enjoy the fruits.



MISSION

IFSSA is focused to develop an effective interface between public and private sectors for enhancing the adoption and spread of public-bred varieties/hybrids by increasing the availability of pure seed stocks of parental lines to private seedsmen, who would further produce and distribute quality F1 seeds to farmers. IFSSA also encourage and employ the application of rapid, reliable and reproducible molecular marker techniques for quick genetic purity tests, variety fingerprinting and MAS. Conclusively, IFSSA strives for realizing food security of the nation.

OBJECTIVES

The very existence of the IFSSA is for linking public-private seed sectors and providing value-added services to the seed industry. The salient objectives are:

- To undertake, promote, develop research activities for maintaining, multiplying and making available genetically identical and pure seeds of parental lines of hybrids/varieties of important agricultural crops
- To develop, research, standardize and offer services pertaining to ancillary seed quality assessment and testing techniques for molecular (DNA) marker genotyping and genetic purity analysis
- To encourage and utilize of molecular marker techniques for genetic purity assessment, which may eliminate/supplement/complement time consuming, labour intensive and expensive field grow-out tests
- To utilize Marker Assisted Selection (MAS) techniques for quick and precise crop improvement schemes
- To act as an effective interface/facilitator between all those engaged in the varietal development, maintenance breeding, multiplication and distribution of breeder and foundation seeds
- To collect, classify, prepare, publish and distribute the information pertaining to the research involved in aforesaid activities

IFSSA would also take-up any other relevant and beneficial activities in the interest of seed industry and farmers



Website

We host all relevant messages in our official website www.ifssa.org.in. We have various webpages for providing information regarding the IFSSA and its activities, availability of seed stocks, membership etc. We wish to launch a separate discussion forum on various prospects and limitations in the seed industry for strategically sorting them by means of concerted efforts through discussions and analysis on public-private partnership modes.

Barwale Foundation's Support

The Barwale Foundation has been extending all financial and logistic support for carrying out all the activities like utilization of the farm facilities for maintenance breeding and breeder seed multiplication, molecular biology facilities for catering of molecular services. We profusely thank the board, executive director and all the staff of the Foundation for their invaluable services, assistance and support.

Core Activities

Maintenance breeding

Maintaining the genetic purity of the parental lines and varieties is the key to the realization of the full potential of the hybrids/varieties. Parental lines get contaminated at different stages of handling. Therefore it is necessary to have a system of maintenance that will prevent the impurities or detect and eliminate those that do occur. IFSSA efforts in safeguarding the genetic identity and purity of hybrid varieties starts with scientifically appropriate maintenance breeding methods viz., paired crosses technique, which is based on the evaluation of parental lines on the basis of heterosis and specific combining ability (SCA). The crosses are made between 50 to 100 individual female (A) and male (B/R) plants, and crossed seeds are evaluated in screening and evaluation nurseries during the subsequent season. Such a procedure would assist in maintaining the heterosis and also the genetic identity of female and male parents as the seeds of individual plants are selected on the basis of maintenance of male sterility as well as enhanced heterosis for yield and its contributing traits. The poor performing progenies are discarded.

The seeds obtained from individual plants are pooled (nucleus seed) for further multiplication of breeder and foundation seeds. In future, only promising/desirable progenies will be included. The problems and lacunae in the present system of maintenance breeding need to be identified, researched and remedial measures are to be incorporated for better maintenance of genetic identity and purity.

Seed Multiplication & Distribution

IFSSA has been undertaking the production of the parental line seeds i.e. breeder seeds and foundation seeds through generation system of seed multiplication.

We meticulously multiply the breeder seed on our research farm under supervision of breeders. Foundation seeds are produced by using breeder seeds at growers' fields with constant inspections of breeders and trained seed production staff.



All precautions and standardized package of seed production technology viz., isolation, land requirement, inspections, rouging, supplemental pollination, harvesting, processing etc is followed in time to produce the seeds of utmost genetic identity and purity. During the year, IFSSA supplied the parental line seeds to public and private organizations.

Molecular Marker Services

● Variety fingerprinting

Use of molecular marker technology in varietal identification, maintenance of genetic purity and determination of genetic distinctiveness (DUS) has been found highly rewarding. The utilization of molecular markers for genotyping / fingerprinting would be of immense importance in the future as such descriptors provide strong claim in the aegis of new PPV & FR Act. IFSSA would offer services to the seedsmen for fingerprinting their varieties/hybrids with reliable and reproducible marker systems.

With the assistance of Barwale Foundation (BF), IFSSA has standardized various SSR/ STMS/STS/SCAR/CAPS markers for genotyping of the hybrid combinations, distinguishing the female from male seeds. The standardized marker was tested across 12 CMS A/B combinations for its efficiency to distinguish seeds of A line from its isogenic /sib B line seeds

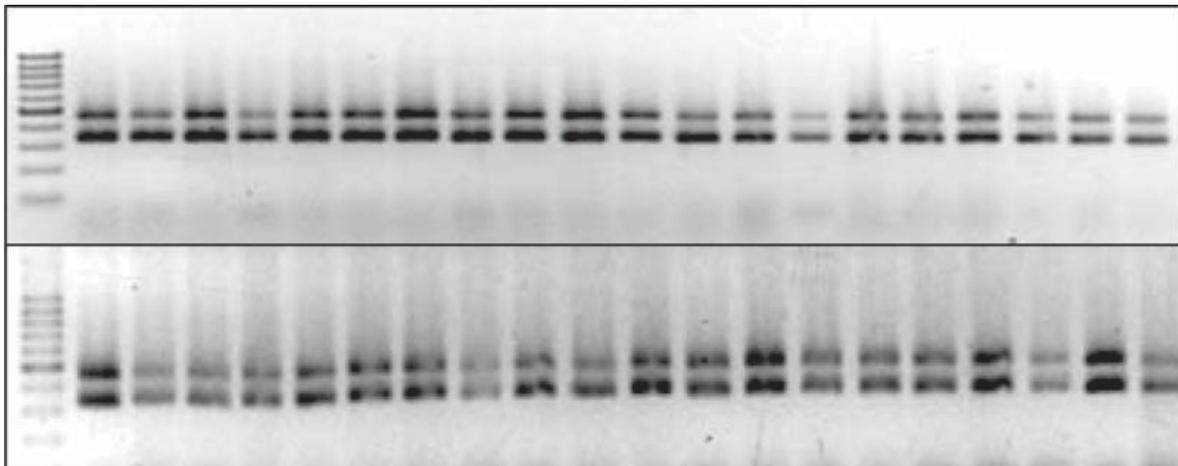
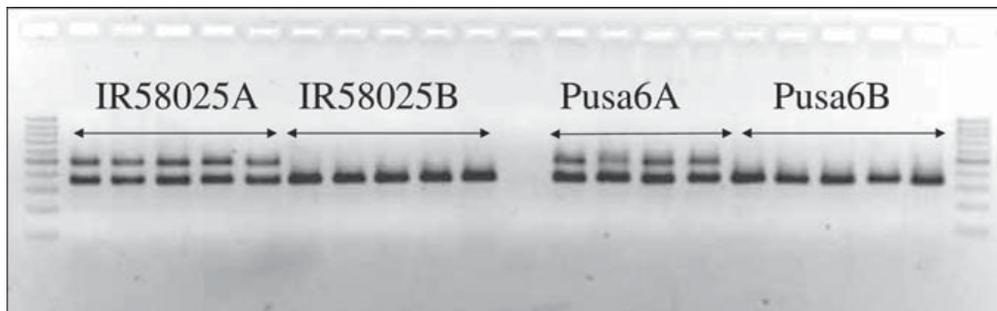


IFSSA has been standardizing reliable, reproducible and rapid molecular markers for quick genetic purity assessment on the basis of single seed assays. Conventionally, morphological descriptors are employed and utilized for the purpose. However, new generation high through-put rapid and reliable molecular markers are found to be advantageous as compared to time consuming, expensive and subjective morphological phenotyping

● Seed Purity Tests

IFSSA offers such services to seed companies for assessing the purity of their commercial hybrid/CMS seed lots with the help of standardized molecular markers. The

reports assisted them in making quick decisions for marketing seeds as well as making payments to growers instead of waiting for at least 5-6 months for field GOT results. IFSSA has so far offered molecular marker services to various seed companies.



● Marker Assisted Selection (MAS)

The potential value of genetic markers, linkage maps and indirect selection in plant breeding is well established. Molecular marker assisted plant breeding (MAS) is the application of molecular markers for screening the breeding populations for the presence or absence of particular gene of interest after probing the candidate DNA with a known primer/gene sequence. The use of DNA markers offers greatest gains as these are environmentally insensitive, abundant and can be screened at very early stages unlike morphological markers and biochemical markers which are sensitive to environment, less abundant and stage specific expression of phenotype. Thus, MAS helps in the saving of breeding time and the cost involved as the plants not containing the gene of interest could be discarded at the very early stages. It is also of great importance in selecting the quantitative traits with low heritability as these are the most difficult characters to work with in the field through phenotypic selection. Thus DNA marker technologies offer plant breeders the potential of making genetic progress more precisely and more rapidly than through phenotypic selection. Genetic markers

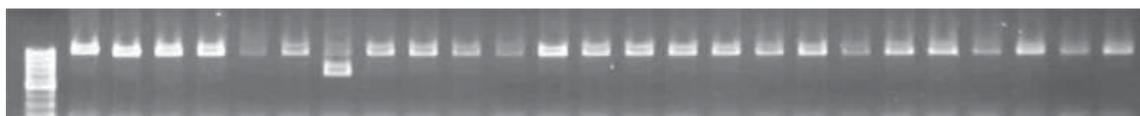
also offer the possibility of addressing previously unattainable goals.

Applications

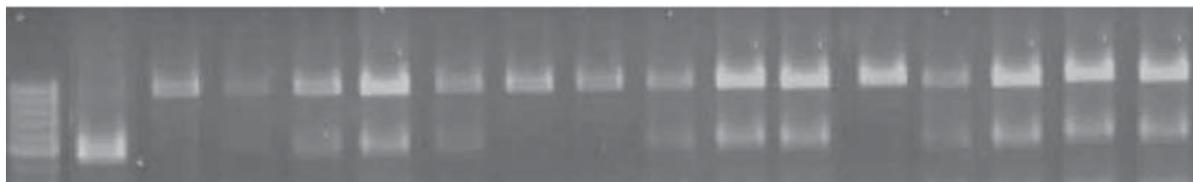
There are many applications for the use of DNA markers in breeding programmes which may be arranged in following five broad groups.

1. Enhanced knowledge of breeding material and systems
2. Rapid introgression or backcross breeding of simple characters
3. Pyramiding of genes from diverse sources
4. Early or easy indirect character selection
5. Fingerprinting for impact assessment and protection of plant breeders' rights

Molecular markers have been used for tagging and mapping of many agronomically important genes. These include some major genes conferring resistance to Biotic stresses like bacterial blight, blast and brown plant hopper etc.



Individual plants screening for Xa-21 gene



Screening for the gene Xa-13

IFSSA also wishes to assist its members in introgression of important genes into their breeding lines of interest.

IFSSA, with the assistance from Barwale Foundation (BF), also would like to extend the service in phenotypic screening of rice materials for BPH resistance.

Demonstration & Field Visits

IFSSA conducts the demonstrations of A X B seed multiplication production technologies. Representatives of both public and private sectors visit the fields for first hand assessment of the promising hybrids and potential technologies.



Memberships in IFSSA

IFSSA enrolls various individuals/institutes as members for appropriate associations and partnerships for effective seed programs and decision- making. The application should be made in the prescribed form. The total number of members is limited to 50, which include 5 categories of memberships viz., a) Founder b) Honorary c) Institutional d) Patron and e) Associate members. The entry fee varies with the type of membership i.e., Rs. 1,00,000/- for Patron, Rs. 25,000/- for Institutional and Rs. 5,000/- for Associate members for certain period. The annual renewal fee for each category is Rs. 2,500/-.

Till March 31, 2008, a total of 26 members from both public (01) and private (25) seedsmen, which comprised of institutional (9) and associate (17) members have been enrolled (Annexure I). We expect more public sector institutes and private organizations to join IFSSA in days to come.

Register of Members

A register of members is maintained with the details of names, occupations, nationalities and addresses of the members for the time-being and the date on which a member is admitted or ceased to be a member as also all other changes relating to changes in membership particulars from time to time. However, the details of IFSSA members are also given in our official [website: www.ifssa.org.in](http://www.ifssa.org.in)

Issue of Certificate

Certificate of membership is issued under the seal of the IFSSA and duly signed by the executive head of the Association.

Annexure - 1

Name	Affiliation	Enrolled	Crops of interest	IFSSA's Services Sought
Institutional Members				
Mr Sushil J Karwa	Managing Director Krishidan Seeds Ltd Pune	Sept. 28, 2006	Rice, Corn, Bajra, Cotton, Vegetables	Promising A,R,B lines for very fine grain rice hybrids and resistance for biotic and abiotic stresses Supply of Paddy parental lines & Seed purity tests of Paddy CMS lines
Mr M. Ramasami	Managing Director Rasi Seeds (P) Ltd Attur	Oct. 18, 2006	Paddy, Corn, Sunflower, Bajra, Jowar	Supply of Paddy parental lines & Seed purity tests of Paddy CMS lines
Mr P.Venkata Rama Rao	Managing Director Manisha Agri Biotech Pvt. Ltd. Hyderabad	Apr. 27, 2006	Wheat, Rice, Bajra, Sunflower Maize	Supply of Paddy parental lines & Seed purity tests of Paddy CMS lines
Mr G.D.V. Ramana Rao	Director Spriha Bio-Sciences Pvt. Ltd Hyderabad	Feb. 15, 2007	Paddy, Sunflower, Bajra, Jowar	Hybrid Rice and Pearl Millet
Dr Rakesh Chopra	Executive Director Biostadt MH Seeds Ltd Hyderabad	Jun 19, 2007	Sunflower, Cotton, Pearl Millet, Sorghum, Vegetables	Rice and Maize
Dr Sukhpal Singh	Sr Plant Breeder & India representative Devgen Seeds &Crop Technology Pvt Ltd. Hyderabad	Jul. 7, 2007	Rice	Foundation seed, training and laboratory facilities
Dr F.B. Patil	Director (tech.) Ajeet Seeds Ltd Aurangabad, Maharashtra	Aug. 29, 2007	Cotton, Paddy, Pearlmillet, Sorghum, maize, sunflower, Vegetables	Supply of parental line seeds, Molecular marker services, testing of purity seeds
Mr Virendra P. Rathod	Vice President Excel Crop Care Ltd	Sept. 29, 2007	Chilli, Bhendi, Bottleguard, Spongeguard, rice and other vegetables	Supply of parental line seeds, Molecular marker services, information on quality seed production technology & research
Ahmedabad, Gujarat				
Dr Jagdeesh Gouda	Sr Plant breeder/Manager, Rice Seed Works India Pvt Ltd.	Jan. 9, 2008	Rice, Cotton, Vegetables	All services offered by IFSSA
Associate Members				
Mr Y. Venkateswarulu	Managing Director Yaganti Seeds Pvt Ltd Hyderabad	Apr. 4, 2007	Corn, Sunflower, Pearl Millet, Sorghum, Rice, Vegetables	MAS, Purity tests, DNA fingerprinting, Foundation Seeds
Mr K.G. Kishan Rao	Managing Director Mrigashira Seeds Pvt Ltd Hyderabad	Apr. 24, 2006	Paddy	Foundation seed, Training and Lab facilities
Mr Kollipara Niranjan Rao	Managing Director GARC Seeds Pvt Ltd. Hyderabad	Apr. 25, 2006	Paddy, Cotton, Jowar, Corn, Sunflower, Pearl Millet, Vegetables Foundation Seeds	Seed purity, DNA fingerprinting, MAS, technical support,

Mr Krishan Chandra Upadhyay	Principal Breeder VNR Seeds Pvt Ltd. Raipur	Apr. 26, 2006	Vegetables, Rice, Pearl Millet,	Vegetables MAS, Purity tests
Mr Sunil Kumar Deshpande	Head, Seed Quality Assurance Metahelix Life Sciences Pvt. Ltd. Bangalore	Jun. 14, 06	Hybrid Rice, Cotton, Sunflower, Maize, Sorghum, Pearl Millet, Vegetables	Supply of parent seeds, supply of rice germplasm Foundation Seed and Hybrid Seed
Dr P.L. Gautam	Managing Director Uttaranchal Seeds & Tarai Development Corporation Ltd. , Pantnagar, Uttarakhand	Apr. 26, 2006 Aug. 5, 2006	Wheat, Rice, Soybean, Urd, Moong, Toria, Mustard, Gram	
Mr Surendra Pratap Singh	Founder Chairman Aishwarya Seed Company Medchal, Hyderabad	Aug. 5, 2006	Corn, Sunflower, Sorghum, Pearl Millet, Rice, Sudan Grass Vegetables	Mol. Bio. Lab facilities, Foundation Seeds, DNA Purity Tests
Mr Anil Kumar Goyal	Director Krishna Seed (P) Ltd Medchal, Hyderabad	Aug. 5, 2006	Bajra, Wheat, Pigeon Pea, Cotton, Potato & Vegetables	All services for seed industry
Mr Akash Kumar	Managing Director Errika Seeds Pvt Ltd. Hyderabad	May 30, 2006	Hybrid Rice	Supply of parent seeds, Supply of rice germplasm
Mr Kadiyala Prakash Babu	Managing Director Vikky's Agri. Sciences Pvt Ltd Hyderabad	Feb. 6, 2006	Corn, Pearl Millet, Sorghum, Vegetables	Hybrid Rice, sharing know-how germplasm
Mr Ponuganti Venu Gopala Rao	Managing Director Pradham Biotech Pvt Ltd. Hyderabad	Aug. 29, 2006	Jowar, Bajra, Corn, Cotton, Sunflower, Paddy, Pulses and Vegetables	Quality BS, MAS techniques, Private- Public Partnerships, providing training to technical staff
Mr Abhimanyu Prasad	Director (Res. & Production) Orrisa Bionex Pvt Ltd. Bhubaneswar	Nov. 14, 2006	Paddy, Sunflower, Corn, Vegetables	Quality seeds of Paddy, Sunflower, Bajra, Corn, Vegetables
Dr Ramesh Singh	Manager (Research) Dhanuka Group New Delhi	Jan. 20, 2007	Wheat, Paddy, Corn, Mustard & Vegetables	Foundation Seed, Training and lab facilities
Dr Sudesh Sharma	Chief Executive Officer Nodai Seed India Pvt Ltd Gurgaon	Jul. 14, 2007	Jowar, Bajra, Corn, Cotton, Mustard, Paddy and Vegetables	Parental line seeds, DNA markers, interaction with other companies
Dr Paresh Verma	Director (Research) Bioseed Research India Pvt Ltd. Hyderabad	Oct. 25, 2008	Paddy, Cotton, Corn, Sorghum, Pearl Millet Eggplant	Molecular Marker Services, Rice Biotechnology
Dr Raman Modi	Director (Technical) Zuari Seeds Limited	Nov. 06, 2007	Cotton, Maize, Pearl Millet, Sorghum, Tomato other vegetables	Supply of parental line seeds & Molecular Marker Services



Public-Private Partnership Model

IARI – IFSSA: A Success story

Effective Public-Private-Partnership model:

Empirical evidence strongly suggests that agricultural research can improve the lives of poor people in developing countries. Agriculture research includes both public and private organizations, having the interest of their own. To ensure food security, increase standard of living and to attain United Nations Millennium Development Goals (MDG), it is necessary to work towards strengthening agriculture by developing strong research and equally proactive dissemination and adoption of new technologies.

One way of ensuring that pro-poor research programs are maintained and strengthened in the face of waning public commitment is through collaboration, partnership or other forms of interaction between public and private sectors. **Public-Private-Partnerships (PPP) are defined as “any collaborative effort between public and private sectors in which each sector contributes to the planning, resources and activity needed to accomplish mutual objectives. It is the constructive means of enhancing the production of goods, services and technologies that would not otherwise be produced by either of the sectors alone”.** PPP in various modes/forms could provide synergetic approach in research and extension efforts. As rightly said by **Dr. Swaminathan**, that the **Universities are doing research and the development of this research into commodities should be taken by the companies.**

When structured appropriately, public-private partnerships can generate significant benefits for private firms and public institutions while also serving the interests of resource-poor or vulnerable households in developing countries and national interest as well. Partnerships can offer private firms access to farmers in emerging markets; the chance to wield constructive influence in the development of legal and regulatory regimes; opportunities to participate in important local, regional, and global forums on pro-poor research; and prospects to improve corporate profiles and reputations. Partnerships can provide public agencies access to new, cutting-edge scientific expertise and knowledge and technologies held by the private sector; mechanisms for developing, marketing and distributing final products; and financial resources that are otherwise increasingly difficult to obtain. Collectively, public-private partnerships improve the capacity of researchers to address problems in agriculture that cannot be solved by a single actor, cannot be achieved in a manner similar to the relatively rapid,

easy gains of the Green Revolution, or require navigation through uncharted, country-specific research systems and regulatory environments. There is ample evidence to suggest that public-private partnerships are increasingly popular in development policy and practice as a means of addressing global issues as diverse as health, environment, finance, governance, and agriculture.

IARI-IFSSA Memorandum of Agreement (MOA) is one of the leading and proven examples in the Public-Private-Partnership (PPP) or relationship model in agriculture sector. Model has been well appreciated by the Union Minister for Agriculture, Government of India. IFSSA, being a non profit organization entered a Memorandum of Understanding (MOU) with IARI, India's premier public research institute in agriculture for the new hybrid of rice Pusa RH-10 developed by IARI. Accordingly IFSSA is being designated as **“sponsored breeder”** of IARI and takes up the maintenance breeding, production of nucleus, breeder and foundation seeds and distribution of foundation seeds (Pusa-6A and PRR-78) to private companies and public sectors. Regardless of the merit, public bred hybrids were not reaching to the farmers on account of many factors.

The private sector in seed industry comprises mainly small and medium size companies. Most of these companies lack well established Research and Development (R&D) facilities. Here IFSSA acts as an interface between Public institutes and private organizations. Therefore producing parent seed and selling them by IFSSA, offer possibilities to smaller seed companies who can produce, process and market public bred proven hybrids.



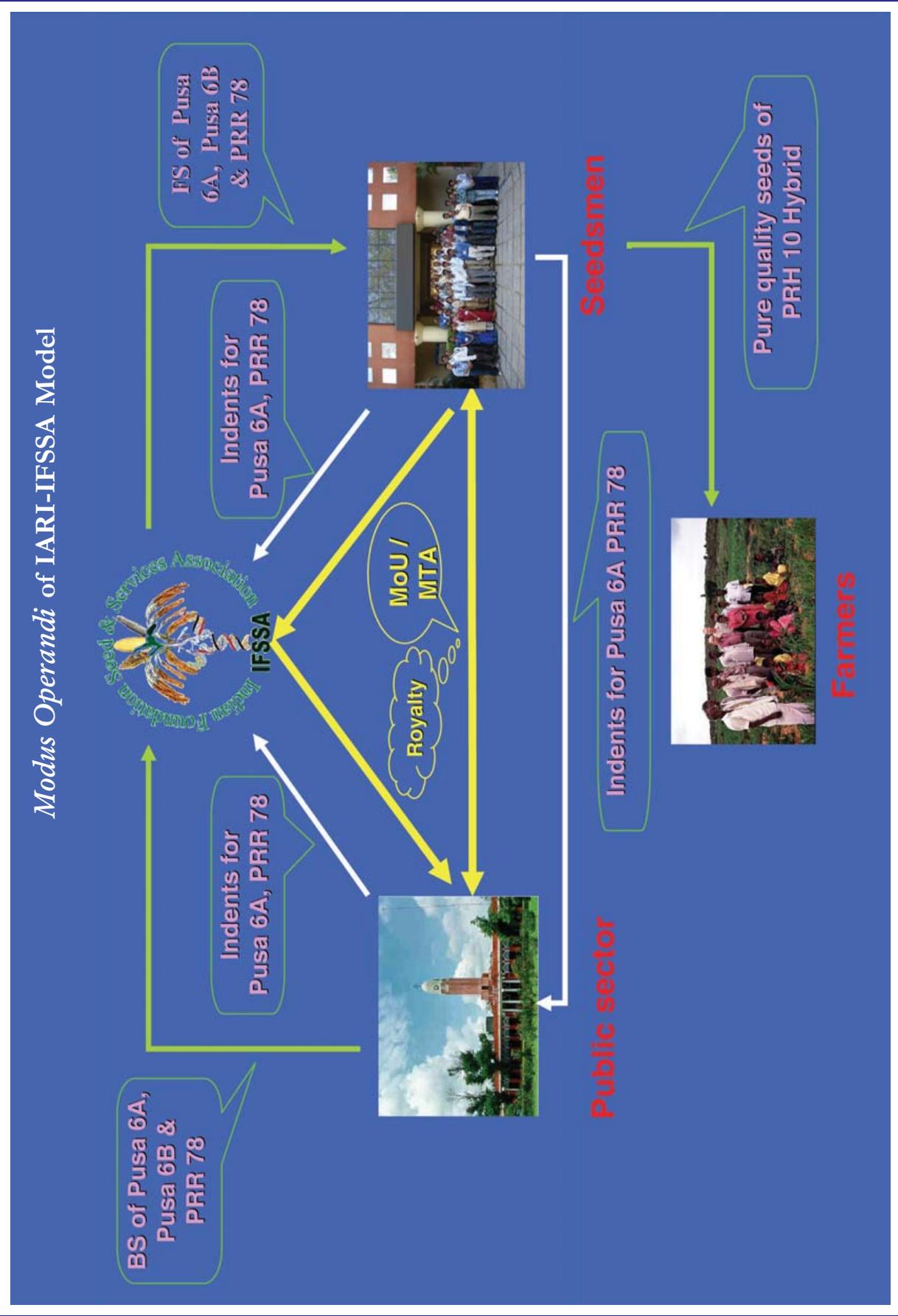
Dr B.R. Barwle handing over the royalty to Dr S.A. Patil, Director, IARI in the presence of Hon'ble Union Minister for Agriculture and DG, ICAR



IFSSA is also facilitating IARI in realization of royalty upon the commercialization of the Pusa RH-10. This model is working well on a win-win note in the best interest of both the organizations. The demand for Pusa RH-10 and the area under cultivation is increasing exponentially year after year, indicating the IFSSA's successfulness in supplying the parent seed of this popular hybrid and providing the quality services to the seedsmen. This is in tern helping IFSSA's goal of achieving food security through increased yield by popularizing technologies and increasing the standard of living of the farmers by enhancing the earning through contract seed production. We look forward signing similar MOU/MOA with other national research institutes and State Agriculture Universities (SAU's).



Modus Operandi of IARI-IFSSA Model





Other Activities

Participation in Seminars / Conferences

Dinesh C. Joshi. “All India ICAR Annual Meeting – AICRIP, at ANGRAU, Hyderabad – April 9-13, 2007

Dinesh C. Joshi. “2nd International Conference on Rice for the Future and the Generation Challenge Program (GCP) Workshop” held in Bangkok - November 05-09, 2007

Dinesh C. Joshi. “Development of GM Rice in India and China” in collaboration with ISAAA at IARI, New Delhi - October 26, 2007

Dinesh C. Joshi. “IRRI-India Drought Breeding Network Meeting” at New Delhi - March 16-18, 2008

Dinesh C. Joshi. Annual Foundation Day Lecture at IARI, Pusa Campus, New Delhi, March 24, 2008

Visitors

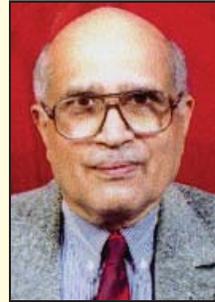
We have received renowned representatives of various CGIAR (IRRI, ICRISAT) and ICAR (IARI, DRR, CRRI) institutes, SAUs (TNAU, ANGRAU, BAU, JNKVV etc), private seed companies and development organizations at our farm and our research laboratory facilities. We sincerely thank all the visitors for their visits, their appreciations and suggestions.

Board of Directors

Mr Raju B. Barwale



Dr Venkatrao Gadwal



Mr Dinesh C. Joshi, Ex-officio



Staff

- Mr Dinesh C. Joshi, Coordinator
- Dr Virupaxagouda Patil, Scientist
- Mr. B. Ravindra, Field Assistant



List of Abbreviations

ANGRAU	:	Acharya NG Ranga Agricultural University
APAARI	:	Asia Pacific Association of Agricultural Res. Institutions
APCoAB	:	Asia Pacific Consortium on Agricultural Biotechnology
BAU	:	Birsa Agricultural University
BB	:	Bacterial Blight
BF	:	Barwale Foundation
BKSC	:	Barwale Knowledge and Study Center
BPH	:	Brown Plant Hopper
BS	:	Breeder Seed
BSKKV	:	Balasaheb Dr. Sawant Konkan Krishi Vidyapeeth
CAPS	:	Cleaved Amplified Polymorphic Sequence
CCMB	:	Centre for Cellular and Molecular Biology
CGIAR	:	Consultative Group on International Agri. Research
CIMMYT	:	Centro Internacional de Mejoramiento de Maíz y Trigo/ International Maize and Wheat Improvement Center
CMS A	:	Cytoplasmic Male Sterile
CMS B-line	:	Cytoplasmic Male Maintainer
CPMB	:	Centre for plant Molecular Biotechnology
CRRRI	:	Central Rice Research Institute
CS	:	Certified Seed
D.G.	:	Director General
DBT	:	Department of Biotechnology
DNA	:	Deoxyribo Nucleic Acid
Dr	:	Doctor
DRR	:	Directorate of Rice Research
DRRH	:	Directorate of Rice Research Rice Hybrid
GCP	:	Generation Challenge Programme
GOT	:	Grow-out test
HHB	:	Haryana Hybrid Bajra
i.e.	:	For example
IARI	:	Indian Agricultural Research Institute
ICAR	:	Indian Council of Agricultural Research
ICMA	:	ICRISAT Millet Male Sterile Line
ICMB	:	ICRISAT Millet Male Sterile Maintainer Line
ICMH	:	ICRISAT Millet Hybrid
ICMR	:	ICRISAT Millet Restorer Line



ICRISAT	:	International Crop Res. Institute for Semi Arid Tropics
IFSSA	:	Indian Foundation Seed and Services Association
IGAU	:	Indira Gandhi Agricultural University
IRRI	:	International Rice Research Institute
JNKVV	:	Jawaharlal Nehru Krishi Viswa Vidyalay
KRH	:	Karnataka Rice Hybrid
MAHYCO	:	Maharashtra Hybrid Seeds Company Limited
MAS	:	Marker Assisted Selection
MoA	:	Memorandum of Agreement
MoU	:	Memorandum of Understanding
NARS	:	National Agricultural Research System
NASC	:	National Agricultural Science Centre
NS	:	Nucleus Seed
NSC	:	National Seeds Corporation
NSD	:	Narendra Shankar Dhan
P	:	Private
PCR	:	Polymerase Chain Reaction
POC	:	Pioneer Overseas Corporation
PPP	:	Public-Private Partnership
PPV & FR	:	Protection of Plant Varieties and Farmers Rights
PRR	:	Pusa Rice Restorer
Pusa RH	:	Pusa Rice Hybrid
R	:	Restorer
R&D	:	Research and development
RAPD	:	Random Amplified Polymorphic DNA
Rf	:	Fertility Restoration
SAU	:	State Agricultural University
SCAR	:	Sequence Characterized Amplified region
SSC	:	State Seeds Corporation
SSR	:	Simple Sequence Repeats
STS	:	Sequence Tagged Sites
TERI	:	The Energy and Resources Institute
TFL	:	Truthfully Labeled Seed
TNAU	:	Tamil Nadu Agricultural University
UASTDC	:	Uttaranchal Seeds& Tarai Development Corporation
VIZ	:	Such as
www	:	World wide web
Xoo	:	Xanthomonas oryzae pv. Oryzae

Photo Gallery



IFSSA Nursery Beds



Planting of A X B lines



Rouging of offtype plants

Field Inspection



Breeder seed production



Breeder seed production plots separated by barrier isolation



Foundation seed production



Farm facilities



Laboratory facilities



Dr wayne H. Freeman in discussion with Dr S.A. Patil, Director, IARI, New Delhi



Dr Virupaxagouda Patil briefing Dr Mangala Rai, DG, ICAR about IFSSA



Dr wayne H. Freeman and Dr Amarjeet Singh in consultation with Dr S.N. Sinha, Head, IARI Regional Station, Karnal



Seed production plot



Hon'ble Union Minister for Agriculture is briefed about the success of the IARI-IFSSA model on the lines of PPP



IFSSA team in discussion with DDG (Crop Sciences), ICAR



IARI-IFSSA team with Hon'ble Union Minister for Agriculture and DG, ICAR



IFSSA staff in discussion with Dr Wayne H. Freeman