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### निदेशक की कलम से . . . . .

समाचार पत्र के इस अंक में प्रतिवेदनाधीन अवधि में प्रमुख अनुसंधानिक एवं प्रशिक्षण संबंधी उपलब्धियों और संस्थान की अन्य गतिविधियों पर प्रकाश डाला गया है।

एक अध्ययन के दौरान, हजार-वें क्रम तक सभी हेडामार्ड आव्यूहों (हेडामार्ड मैट्रिसेस) तैयार करने (जिसकी निर्माण विधियाँ जानी मानी हैं) के लिए एक कम्प्यूटर कार्यक्रम का विकास किया गया है। हेडामार्ड आव्यूहों को तैयार करने के लिए आठ विधियों का उपयोग किया गया है। विधियों को एक लाइब्रेरी की तरह लागू किया गया है ताकि इसका उपयोग किसी भी अन्य कार्यक्रम द्वारा किया जा सके। सामान्य प्रयोक्ताओं के लाभार्थ विजुअल बेसिक में एक फ्रण्ट-एण्ड कार्यक्रम विकसित किया जा रहा है। सामर्थ्य 2 के रिज़ॉल्वेबल आर्थोगोनल व्यूहों और हेडामार्ड आव्यूहों की सहायता से कुछ बेहतर अतिसंतुप्त अभिकल्पनाएं (सुपरसैचुरेटेड डिज़ाइन्स) विकसित की गई हैं।

एक साथ हजारों जीनों के सापेक्ष अभिव्यंजना स्तर का अध्ययन करने के लिए सूक्ष्म-व्यूह (माइक्रो-ऐरे) परीक्षण किए गए हैं। इन परीक्षणों में चार परीक्षण कारक हैं- व्यूह (ऐरे) (A), डाई (D), किस्म (V) और जीन (G)। उन परीक्षण दशाओं में जहाँ जीनों का एक समान सेट प्रत्येक व्यूह में देखा जाता है, जीन/ जीन विशिष्ट प्रभाव (G, AG, DG, VG), ग्लोबल प्रभावों (A, D, V) के प्रति आर्थोगोनल होते हैं। मॉडल में से जीन विशिष्ट प्रभावों को छोड़ कर उन अभिकल्पनाओं के इष्टतमत्व पहलुओं (ऑप्टिमेलिटी आसपैक्ट्स) का अध्ययन किया गया है।

सभी ब्लॉक अभिकल्पनाओं एवं रो-कॉलम अभिकल्पनाओं के कैटेगॉरी प्राप्त किए गए और नियत/ मिश्रित प्रभाव मॉडलों तथा रोबस्टनेस स्तरों के तहत A- और D- दक्षताओं के प्रति न्यूनतम बाउण्ड वाली बेहतर उपलब्ध अभिकल्पनाएं तैयार की गई हैं।

“साफ्टवेयर की सहायता से कृषि अनुसंधान की सांख्यिकीय विधियाँ” और “नेट प्रौद्योगिकी की सहायता से वैब आधारित अनुप्रयोगों की अभिकल्पना और विकास” नामक दो 21 दिवसीय प्रशिक्षण कार्यक्रम और एक अन्तरराष्ट्रीय प्रशिक्षण कार्यक्रम “कृषि अनुसंधान में बायोमैट्रिक्स” चलाया गया।

इनके अतिरिक्त संस्थान द्वारा “कृषि अनुसंधान में सांख्यिकी और सूचना तंत्र” पर एक अन्तरराष्ट्रीय सम्मेलन (ICSI2006) का आयोजन किया गया। संस्थान द्वारा अनेक बैठकों, सम्मेलनों, संगोष्ठियों, कार्यशालाओं, इत्यादि में भी सहभागिता की गई। आशा है कि इस अंक की विषयवस्तु नार्स (एन.ए.आर.एस.) के वैज्ञानिकों के लिए सूचनाप्रद एवं उपयोगी होगी। इस समाचार पत्र की विषयवस्तु में भावी सुधार लाने के लिए आपके सुझावों का स्वागत है।

(सुखदेव शर्मा)

## RESEARCH ACHIEVEMENTS

- Hadamard matrices are useful for construction of fractional factorial plans for two-level factorials. Hadamard matrix, H is a square matrix with entries  $\{+1, -1\}$  and satisfies  $HH' = n I_n$ , n the order of the matrix H being a Hadamard number, i.e.,  $n = 1, 2$  or  $0 \pmod{4}$ . Various construction methods are available to construct Hadamard matrices. A computer program has been developed to construct all Hadamard matrices up to order 1000 for which construction methods are known. So far, eight methods have been implemented to generate Hadamard matrices. Hadamard matrices of order 668, 716, 764 and 892 are unknown and are not included. Further, Hadamard matrices of order 292, 412, 436, 452, 508, 584, 596, 604, 652, 724, 772, 872, 876, 904, 932, 956, 964, 996 have not been constructed so far. The construction methods included are Paley (two methods), Kronecker, Ehlich, Williamson, Baumert-Hall, Goethals and Seidel and Cooper and Seberry. Other methods of construction are under development. The methods are implemented as a library so that it can be used by any other program. A front-end program is also being developed in Visual Basic for the benefit of general users.

Hadamard matrices can also be used to construct Resolution III plans. Thus, using the program, it is possible to construct many orthogonal arrays of strength two in two symbols. Further, Resolution IV plans or orthogonal arrays of strength three in two symbols can be obtained from Hadamard matrices using the Fold over technique. Generations of orthogonal arrays of strength two and three in two symbols have also been included in the program.

Supersaturated designs (SSDs) are fractional factorial designs for asymmetrical factorials in which the number of parameters to be estimated is more than the number of runs. Construction of SSDs satisfying some measures of goodness of the design is an important problem. Some series of SSDs for asymmetrical factorial experiments have been generated using resolvable orthogonal arrays of strength two and Hadamard matrices.

- Micro-array experiments are conducted to study the relative expression level of thousands of genes simultaneously. These are also called as DNA chips, gene chips, biochips, DNA micro-arrays or simply the arrays. In these experiments, four experimental factors are array (A), dye (D), variety (V) and gene (G). For the experimental situations where the same set of genes is spotted on each array, gene/ gene specific effects (G, AG, DG, VG) are orthogonal to global effects (A, D, V). Optimality aspects of designs for micro-array experiments, therefore, have been studied leaving gene specific effects from the model, by taking only array, dye and variety effects in the model. Designs that are good under the model

containing global effects are also good under the model containing both global and gene specific effects.

- To deal with the problem of obtaining efficient designs when array effects are random, the lower bounds to the A- and D-efficiencies of the designs in a given class of designs have been obtained for block designs under mixed effects model. The existing algorithm based on exchange and interchange of treatments has been modified by incorporating the procedure of computing lower bounds to A- and D-efficiencies under mixed effects model. The algorithm developed is general and can be used for generation of efficient block designs for any  $2 \leq k < v$ , where  $v$  is the number of treatments (varieties) and  $k$  is block size. Using this algorithm, efficient block designs for micro-array experiments have been obtained in the parametric range  $3 \leq v \leq 16$ ,  $v \leq b \leq v(v-1)/2$  and  $17 \leq v=b \leq 25$ ; and  $k = 2$ , where  $b$  is the number of arrays. A total of 569 designs including all the 14 unreduced balanced incomplete block designs have been obtained. Efficient block designs obtained under fixed effects model have been compared with the best available designs in the literature and 2-associate partially balanced incomplete block designs. 30 designs are found to be more efficient than the best available block designs. The robustness aspects of designs obtained and best available block designs have been investigated under mixed effects model. Out of 30 more efficient designs, 7 designs are found to be strongly robust, 18 designs are found to be robust and the remaining 5 designs are non-robust.
- The catalogues of all efficient block designs and row-column designs obtained and the best available designs have been prepared along with their lower bounds to A- and D-efficiencies under fixed/ mixed effects models along with their robustness status. Strength of the algorithm for obtaining block designs/ row-column designs for 3-colour micro-array experiments has also been demonstrated with the help of examples.
- After the conduct of experiment using an appropriate design, the next step is analysis of data to identify differentially expressed genes from micro-array experiments. The analytical procedure based on single-step mixed effects model as well as two-stage linear mixed effects models considering array effects as random to identify differentially expressed genes from micro-array experiments has been developed and illustrated using real life data sets.

#### HUMAN RESOURCE DEVELOPMENT

- A 21-days training programme was organised on “Statistical Methods for Agricultural Research with Use of Software” organised during 01- 21 November 2006 under the aegis of Centre of Advanced Studies. The training programme was aimed at



providing the participants an opportunity to study and learn statistical techniques of data analysis using software. This exposure is helpful in speedy and appropriate data analysis and drawing valid inferences. The course was oriented towards application and a combination of lectures, exercises, and hands-on exercises on SPSS/ SAS/ MS-EXCEL with emphasis on SPSS. The topics were covered under following four modules:

- (i) Statistical Software and Information Systems in Agricultural Research
- (ii) Statistical Methods in Agricultural Research
- (iii) Planning of Agricultural Experiments/ Surveys
- (iv) Modern Approaches to the Analysis of Agricultural Data.

Dr. Seema Jaggi was the Course Director for this training programme.

- One International training programme for a trainee from NARC, Nepal “Biometrics in Agricultural Research” during 4<sup>th</sup> October to 29<sup>th</sup> November 2006 was successfully organised.



- Another 21 days CAS training programme on “Design & Development of Web based Application using .NET Technology” was successfully organized during 22 November-



12 December 2006. Smt. Alka Arora was the Course Director for this training programme. This training programme offered sufficient practical knowledge to develop and host a web application using Microsoft .NET technology on IIS web server.

In brief the practicals are divided into four modules:

- (i) Hypertext Mark-Up Language (HTML)
- (ii) Internet Information Server
- (iii) SQL Server
- (iv) ASP.NET

#### HONOURS/ AWARDS (पुरस्कार)

- वर्ष 2005-06 के दौरान सरकारी कामकाज में हिन्दी के प्रयोग में उल्लेखनीय योगदान के लिए परिषद् की राजर्षि टंडन राजभाषा पुरस्कार योजना के अन्तर्गत बड़े संस्थानों के वर्ग में संस्थान को प्रथम पुरस्कार तथा संस्थान की हिन्दी पत्रिका “सांख्यिकी विमर्श” को उत्कृष्ट गृह पत्रिका के प्रकाशन के लिए गणेश शंकर विद्यार्थी हिन्दी पत्रिका पुरस्कार योजना के अन्तर्गत द्वितीय पुरस्कार प्रदान किए गए । ये पुरस्कार परिषद् के वार्षिक पुरस्कार वितरण समारोह के अवसर पर दिनांक 28 नवम्बर, 2006 को परिषद् के महानिदेशक महोदय द्वारा प्रदान किए गए जिन्हें संस्थान के निदेशक महोदय ने ग्रहण किए ।



- Dr. Rajender Parsad, National Fellow, was awarded Associate Fellow of National Academy of Agricultural Sciences, New Delhi from January 01, 2007.

#### PANORAMA OF ACTIVITIES

An International Conference on “Statistics and Informatics in Agricultural Research” ICSI2006 was organized by IASRI, New Delhi during 27-30 December 2006 to mark the Diamond Jubilee Celebration of the foundation of Indian Society of Agricultural Statistics.

To meet the goal of the conference, the following six major sessions were convened and 54 invited lectures were delivered by eminent scientists of International repute.

- Theme 1: Statistical Applications in Agricultural Research
- Theme 2: Emerging Issues in Areas of Basic Statistical Research
- Theme 3: Agricultural Informatics
- Theme 4: Statistical and Computational Biology in Agriculture
- Theme 5: Statistical and Economic Issues for Prosperity of Rural Community
- Theme 6: Human Resource Development for Agricultural Statistics and Informatics

As a prologue to the conference, two pre-conference workshops on “Hotspot Geoinformatics” and “Regression Diagnostics” were organized on 26 December 2006.



The Hon'ble Minister of Statistics and Programme Implementation, Shri GK Vasan inaugurated the conference. The Minister emphasized the need for conducting basic research in Statistics and Informatics in newer emerging areas of micro array experiments; computational biology; genomics of plant, livestock, fishery, flora and fauna; biodiversity, evaluation and valuation; statistical modeling; precision agriculture, etc. so as to meet the challenges of agricultural research. For micro-level policy planning research, small area techniques should be continued more rigorously. Efforts should be made to improve the quality of data and while providing the estimates timeliness and accuracy of estimates of parameters of interest should be maintained for proper and effective policy planning. Further, the definitions of various parameters used by different agencies should be uniform. Dr. Mangala Rai, Secretary, DARE and DG, ICAR and President, ISAS delivered the Presidential Address. Dr. Rai echoed the feeling that in view of the applicational nature of the discipline of Statistics to other sciences, it is important that the scientists of this discipline should work in close collaboration with the subject matter specialists so as to enable the information generated through research in Statistics and Informatics get converted into knowledge.

During the conference, three Plenary Talks were delivered by Dr. GP Patil, Dr. James H Matis and Dr. Padam Singh. Besides, there were two Memorial Lectures, viz., Dr. Rajendra Prasad Memorial Lecture, delivered by Dr. GS Bhalla and Dr. VG Panse Memorial Lecture, delivered by Dr. AK Nigam.

155 posters were presented during the conference. Many important recommendations have emerged from the conference.

#### PARTICIPATION OF INSTITUTE

##### In Various Meetings

- Meetings of the screening Committee for the awards and fellowships of the Ministry of Statistics and Programme Implementation.
- Meeting of Board of Post-graduate studies at NEH University, Shillong on 09 October 2006.
- A Forum “Connecting the Next Billion” on 13 October 2006 at Hotel Le Meridien, New Delhi.

- Meeting of Executive Council of the Indian Society of Agricultural Statistics on 17 November 2006.
- Meeting with Director, Fisheries Statistics regarding ensuing TMC meeting at Barrackpore.
- Meeting pertaining to the project entitled "Assessment of Harvest and Post-harvest Losses" under the Chairmanship of ADG (Engg.) on 20 November 2006.
- 8<sup>th</sup> meeting of the Task Force on "Assessment of Survey Capabilities of Private Sector" at CSO, Sardar Patel Bhawan on 30 November 2006.
- Meetings of Technical Monitoring Committee on 07 and 08 December, 2006 at CIFRI, Barrackpore, West Bengal.

#### In Conference/ Workshop/ Symposia/ Training etc.

Various Scientists and Technical Personnels of the Institute participated in

- 2<sup>nd</sup> International Rice Congress at New Delhi during 09-13 October 2006.
- "Agriculture Summit 2006: Reforms for Empowering the Farmer", organized jointly by DOAC, MOA, GOI and FICCI at Vigyan Bhawan, New Delhi during 18-19 October 2006.
- Group Meeting of AICRP on STCR held at IASRI, New Delhi during 02-03 November 2006. In this meeting, design and analysis of experiments under AICRP on STCR were presented. It was decided that IISS, Bhopal and IASRI, New Delhi will take a collaborative project to develop an online software for the analysis of experimental data of AICRP on STCR.
- International Conference on "India and the Global Economy" during 06-07 November 2006 at Vigyan Bhawan, New Delhi.
- 66<sup>th</sup> Annual Conference of ISAE held at ICAR Research Complex, NEH Region, Meghalaya during 08 -10 November 2006.
- 9<sup>th</sup> Annual Conference of Society of Statistics, Computer and Applications held at Department of Statistics, Saurashtra University, Rajkot during 11-13 November 2006.
- Dairy Industry Conference at National Dairy Development Board, Kolkata during 23-25 November 2006.
- National Conference on "Innovations in Indian Science, Engineering and Technology" organized by National Physical Laboratory, held at IARI, New Delhi, during 26-28 November, 2006.
- National Symposium on "Ornamental Bulbous Crops" held at SVBPUA & T, Modipuram, Meerut during 05-06 December, 2006.
- Workshop of AICRP on "Post Harvest Technology" on 09 December, 2006 at OUAT, Bhubneshwar.
- Pre-conference Workshops on "Hotspot Geoinformatics" and "Regression Diagnostics" of ICSI2006 on 26 December 2006.
- International Conference on "Statistics and Informatics in Agricultural Research" to mark the Diamond Jubilee Celebrations of Indian Society of Agricultural Statistics during 27-30 December 2006.

#### Lectures Delivered

- Invited lectures during a workshop on "General Mathematics for Undergraduate Students" organized by University of Delhi, South Campus from 03-07 October 2006.
- A special talk on "Design and Analysis of Experiments under AICRP on STCR" in the Group Meeting of AICRP on STCR held at IASRI, New Delhi during November 02-03, 2006.
- Invited talks during International Conference on "Statistics and Informatics in Agricultural Research" ICSI2006 held at New Delhi during 27-30 December 2006 at New Delhi.

#### हिन्दी कार्यशाला

- दिनांक 17 तथा 18 नवम्बर, 2006 को संस्थान के कर्मियों के लिए "राजभाषा नीति एवं कार्यान्वयन" विषय पर एक दो दिवसीय हिन्दी कार्यशाला का आयोजन किया गया जिसमें 17 नवम्बर, 2006 को क्षेत्रीय कार्यान्वयन कार्यालय (दिल्ली) के उपनिदेशक, श्री प्रेम सिंह ने "राजभाषा नीति एवं कार्यान्वयन" विषय पर तथा 18 नवम्बर, 2006 को राजभाषा विभाग, गृह मंत्रालय के उपनिदेशक (कार्यान्वयन), श्री नेत्र सिंह रावत ने "ऑकड़ों का रख-रखाव" विषय पर व्याख्यान दिए।



#### COMPUTING FACILITIES

##### Wide Area Network

- Internet services have been provided to the users and the website of IASRI is being updated regularly. This site has been visited 292628 times since 05 September 2003.

#### SEMINARS DELIVERED

- 12 seminars in different areas of Agricultural Statistics and Computer Application were delivered.

These seminars included presentation of salient findings of the completed research projects, thesis seminars and course seminars of students of M.Sc. and Ph.D. (Agricultural Statistics) and M.Sc. (Computer Application).

Seminars Delivered		
Category	Type of seminar	Number
Student	Course	08
	Thesis	02
Scientist	Project completion	02
<b>Total</b>		<b>12</b>

## PUBLICATIONS

### Research Papers Published

- Bhatia, Ajit Kaur, Parsad, Rajender, Sharma, SK and Kaur, Rajinder (2005). Statistical assessment of different crop rotations. *J. Farm. Sys. Res. Dev.* **11(2)**, 190-196.
- Bhatia, VK and Paul, Amrit Kumar (2006). Estimation of heritability by Bayesian approach. *Ind. J. Anim. Sci.*, **76(10)**, 860-861.
- Bhatia, VK and Paul, Amrit Kumar (2006). Effect of aberrant values on estimation of heritability. *Ind. J. Anim. Sci.*, **76(10)**, 862-863.
- Iquebal, MA, Paul, Amrit Kumar and Bhatia, VK (2004). Empirical comparison of different estimates of heritability of herd life using related auxiliary traits in case of non-normal situations. *Ind. J. Anim. Sci.*, **76(9)**, 750-754.
- Kaul, S and Beohar, BB (2006). An empirical study of role of indigenous minor forest products in tribal economy of Madhya Pradesh. *Samarika*, 42-43 (Bilingual).
- Nanda, Meena (2006). Status of food security in India - An overview. Special Issue on World Food Day in *Intensive Agriculture*, July-December, 45-48.
- Narang, MS, Sud, UC and Gupta, AK (2006). Estimation of finite population regression coefficient when the variables are subject to measurement error. *Int. J. Agril. Statist. Sci.*, Muzaffarnagar (UP), **2(2)**, 151-160.
- Sarika, Wahi, SD and Rao, AR (2006). On the robustness of estimates of genetic correlation. *Ind. J. Anim. Sci.*, **76(9)**, 759-763.
- एस.डी. वाही, प्रकाश लाल एवं वी.पी. सिंह (2006). भारतीय बकरियों में अनुवांशिक अंतर मापने की तकनीक। कृषि चयनिका, जुलाई-सितम्बर, 2006.
- Swain, SK, Gupta, JP, Sahoo, PK, Kar, Abhijit and Parsad, Rajender (2006). Studies on rupture characteristics of drum roasted cashew nut. *J. Agril. Engg.*, **43(3)**, 122-125.
- Singh, DR, Kaul, Sushila and Sivaramane, N (2006). Migratory sheep and goat production system: The mainstay of tribal hill economy in Himachal Pradesh. *Agril. Eco. Res. Rev.*, **19(2)**, 387-398.
- Wahi, SD, Bhatia, VK and Rao, AR (2006). Study of statistical properties of genetic correlation using bootstrap technique. *Ind. J. Anim. Sci.*, **76(9)**, 755-758.

### Book Chapters (Published)

- VK Gupta and Rajender Parsad (2006). Statistical Designing of Experiments with Emphasis on Hill Agriculture. In: *Sustainable Production from Agricultural Watersheds in North West Himalaya*. Eds. HS Gupta, AK Srivastava and JC Bhatt, Vivekananda Parvatiya Krishi Anusandhan Sansthan, Almora, 457-474.
- Rajender Parsad, Anshu Dixit, PK Malhotra and VK Gupta (2007). Geoinformatics in Precision Farming: An Overview. In: *Geoinformatics Applications for Sustainable*



### Forthcoming Training Programmes under Centre of Advanced Studies

Programme	Course Director
Advances in Data Analytical Techniques (08-28 February 2007)	Dr. Rajender Parsad
Advances in Quantitative Techniques for Policy Analysis in Agricultural Economics (02-22 March 2007)	Dr. AK Vasisht

### Saleable Technologies

- Statistical Package for Factorial Experiments (SPFE 1.0)
- Statistical Package for Agricultural Research (SPAR 2.0)
- Statistical Package for Agricultural Designs (SPAD)
- Statistical Package for Block Designs (SPBD 1.0)
- Statistical Package for Animal Breeding (SPAB)



Lightening of Lamp on the Inaugural Function of ICSI2006

*Development*. Eds. AK Singh and UK Chopra, 39-78, New India Publishing Agency, New Delhi.

#### Research Papers Accepted for Publication

- Chandran, KP and Prajneshu. Nonparametric regression methodology for modelling and forecasting country's meteorological subdivisions rainfall data. *J. Agrometeorology*.
- Kumar, Rajender, Kapoor, JK and Singh, NP. Statistical look for cultural-cum-manurial experiments. *J. Ann. Agric. Res.*
- Sarika, Wah, SD and Rao, AR. Effect of outliers on the estimates of genetic correlation. *Ind. J. Anim. Genet. Breed.*

#### PAPER PRESENTATION

##### Research Papers Presented in the Conference/Symposium etc.

Scientists of the Institute made poster presentation in

- 2<sup>nd</sup> "International Rice Congress" at New Delhi during 09-13 October 2006.
- Ninth "Annual Conference of Society of Statistics, Computer and Applications" held at Sourashtra University, Rajkot during 11-13 November 2006.
- दिनांक 24-26 नवम्बर 2006 के दौरान आयोजित भारतीय कृषि अनुसंधान संस्थान, पूसा, नई दिल्ली में "भारतीय विज्ञान, अभियांत्रिकी एवं प्रौद्योगिकी में अन्वेषणों पर राष्ट्रीय संगोष्ठी"।

- International Conference on "Statistics and Informatics in Agricultural Research" ICSI2006 organized by IASRI, New Delhi during 27-30 December 2006 at New Delhi.
- Gupta, AK, Bathla, HVL, Sud, UC and Tyagi, KK. "Methodology for estimation of production of flowers", presented in the National Symposium on "Ornamental Bulbous Crops" held at SVBPUA & T, Modipuram, Meerut during 05-06 December 2006.

#### PERSONNEL

##### Appointment

- Sh. Roop Singh, SS, Gr.-II appointed as Driver (T-1) w.e.f. 28-12-2006

##### Congratulations on your Promotion

- Sh. BN Chakravarti, (T-6), w.e.f. 01-01-2003
- Sh. Ghasi Ram, (T-6), w.e.f. 01-01-2003
- Smt. Sunita, Steno, Gr.-III (under ACP), w.e.f. 27-08-2006
- Smt. Suman Khanna, Steno, Gr.-III (under ACP), w.e.f. 31-08-2006
- Smt. Alka Nayyar, Steno, Gr.-III (under ACP), w.e.f. 20-08-2006

##### Wish you Happy Retired Life

- Smt. KK Bhutani, KPO (T-5), w.e.f. 30-11-2006
- Smt. Catherine Kujur, KPO (T-5), w.e.f. 30-11-2006
- Sh. UN Jha, (T-6), w.e.f. 31-12-2006
- Smt. Seeta Malhotra, AAO, w.e.f. 31-12-2006

#### OBITUARY

The Director, Staff and Students of IASRI deeply condole the death of Dr. Subodh Kumar Bhatnagar, Technical Officer, who expired on 16 October 2006

फार्म संबंधी सभी समस्याओं पर विशेषज्ञ की सलाह के लिये प्रातः 6.00 बजे से रात 10.00 बजे तक सभी सातों दिन टोल फ्री नम्बर 1551 पर डायल करें।

For expert's advise on all farm related problems, dial toll free number 1551 from 6 am to 10 pm on all seven days

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