Guidelines for Netaji Subhas - ICAR International Fellowships

1. Objectives:

In its continued efforts towards enhancing and sustaining the standards, quality and relevance of higher agricultural education in the country, the Indian Council of Agricultural Research (ICAR) here-in-after, referred as the Council, has instituted **International Fellowships** with dual purpose of (i) human resource development in cutting edge technologies, and (ii) demonstrating the strength of Indian agricultural system abroad. The objective is to develop competent human resource that are trained in the identified best laboratories in the world (for Indian candidates) and similarly expose overseas candidates to the best Indian Agricultural Universities (AUs) in the ICAR-AU system (comprising of State Agricultural Universities, Central Agricultural University Imphal, ICAR-Deemed Universities, Allahabad Agricultural Institute-DU, Central Universities having agricultural faculty) for creating a pool of scientist-envoys for enhanced future co-operation.

2. Title:

The fellowship is named as "Netaji Subhas - ICAR International Fellowship (NS-ICARIF)" and the awardee will be called "NS-ICAR International Fellow".

3. Purpose:

The NS-ICARIFs are available to support Indian/ Overseas nationalsfor pursuing doctoral degree in agriculture and allied sciences, in the identified priority areas, to the

- Indian candidates for study abroad in the identified overseas Universities/Institutions having strong research and teaching capabilities and
- Overseas candidates for study in the best Indian AUs in the ICAR-AUs system.

4. Location:

For study in the identified institutions having strong research and teaching capabilities and adequate strength in terms of faculty and infrastructure facilities, the NS ICAR-IFs are tenable at:

- identified overseas institutions in case of **Indian candidates** and
- identified Indian Agricultural Universities (AUs) from ICAR-AU system in India in case of **overseas candidates**.

5. Tenure of Fellowship:

5.1. The NS-ICARIFsare available to Indian candidates as well as overseas candidates for a period of three years.

5.2. The tenure of fellowship will not be extended in any case, in so far as the Council support is concerned.

5.3. In case the fellow is not able to complete his/her degree during this period, he/she will use his/her own resources for completing the degree.

5.4. In case the fellow is not able to complete even after 2 years of the prescribed duration of the programme for which fellowship was sanctioned, the Council may take necessary steps, for the recovery of the fellowship paid.

6. Number of Fellowships:

Number of fellowships available every year for a programme leading to Ph.D. degree under this scheme will be thirty (30). The allocation of fellowships between Indian and Overseas candidates will depend upon the availability of good candidates in the identified priority areas.

7. Eligibility:

7.1. Master's degree in agriculture/allied sciences with an Overall Grade Point Average (OGPA) 6.60 out of 10.0 or 65% marks or equivalent will be the eligibility requirement for the NS-ICARIFs.

7.2. The fresh candidates should not be more than 35 years of age on the last date prescribed for receipt of applications. The upper age limit for In-service candidates will be 40 years on the last date for receipt of applications.

7.3. The notification for fellowship will contain the detailed eligibility requirements.

7.4. Netaji Subhas- ICARIF would be available for both, fresh and in-service candidates. However, the fresh candidates should have completed their qualifying degree not more than two years before the specified date in the year of admission. The in-service candidates from India should be employed in the ICAR-AU system.

7.5. The Council will identify and announce the priority areas of research and the list of institutions for admission, one year in advance, for availing the Netaji Subhas- ICAR IFs.

8. Mode of Application:

8.1. The candidate should submit an application for the fellowship, on-line, in the prescribed format.

8.2. The area of study and the line of the proposed research work should be in the identified priority area relevant to Indian/Global agriculture as identified by the Council and the same shall be notified one year in advance.

8.3. The applicant shall provide two references along with their contact Email addresses, in support of his application, who may be directly contacted by the Council for obtaining comments in the prescribed format on his candidature. One of the two referees should preferably be his/her supervisor in the current occupation (if employed) and one who is an expert in the area and well acquainted with the candidate's work.

8.4. The applicants for the ICAR-IF must obtain at their own level, an acceptance of their admission in the Ph.D. degree programmes with identified area of study at the

identified Indian AUs in case of overseas applicants and the identified overseas institutions in case of Indian applicants. Such acceptance letters should preferably be enclosed with the application for the fellowship.

8.5. The candidates should satisfy themselves regarding admission and course requirements of the university before identifying these as a place of study.

8.6. Applications for NS-ICARIFs will be invited on annual basis through announcements published in Indian national newspapers and the notification on ICAR website "http://www.icar.org.in". Indian diplomatic missions in foreign countries will also be informed through e-mails.

9. Mode of Selection:

9.1. The candidates will be evaluated based on parameters/weighted scale thereby taking into account the relevance of the area of study, the proposed research plan, academic records, achievements and past work experience of the candidate.

9.2. The selection will be made on the basis of evaluation score and subsequent interview by a Selection Committee, constituted by the Council and duly empowered to judge the suitability of candidate with regard to the importance of the area of study and the proposed research plan.The Committee may also decide to conduct telephonic/teleconferencing interview for the purpose. The overseas candidates may even be interviewed by experts as identified by the Council who may be based in their home country.

9.3. The candidate should have clear record of good conduct all-through, duly certified by the Competent Authority of the University last attended or the present employer in case of in-service candidate.

9.4. At the time of interview, the applicants must furnish a letter of acceptance for their admission in the respective degree programme at the University.

9.5. The in-service Indian candidates must also furnish deputation approval by their respective Director of ICAR Institutes/Vice-Chancellor of Agricultural Universities.

9.6. Once selected, the candidates must register for the programme within one year from the date of issue of letter of fellowship award. In case of delay, the offer will get terminated automatically and no separate communication towards cancellation will be issued by the Council.

10. Fellowship Amount and Contingencies:

The fellow will be entitled to the following:

10.1. To-and-fro, economy class air ticket for international travel, by the shortest route, from the airport, nearest to the residence/ work place of the candidate to the airport, nearest to the destination University in respect of both Indian and Overseas candidates (Air tickets to be provided by the Council).

10.2. The overseas fellows will be entitled for economy-class-travel cost reimbursement from port of arrival in India to the destination University in India and back.

10.3. For Indian candidates, the cost on travel from place of residence/work to the port of departure in India and from port of arrival to the destination University overseas will be met by the fellows themselves or by their sponsoring organization.

10.4. Amount payable to the International fellowship candidates:

Ph.D.	**Amount not exceeding**	**Lump-sum payments towards contingent and preparatory expenses**
Indian fellows going abroad	US$ 2,000/- per month	US$ 1,000/- per year
Overseas fellows in India	INR 40,000/- per month	INR 25,000/- per year

10.5. The fellowship amount for the first six months, as first installment, will be released by the Council to the fellow through government notified/ approved bank to be deposited in the bank account of the fellow on receiving his/ her acceptance for the fellowship and admission letter received from the host University.

10.6. Thereafter, the amount of fellowship will be released to the fellow, after receiving the academic progress report from the fellow duly certified by the concerned advisor/ supervisor/ head of institution.

10.7. The first installment to the Indian fellow will be paid in Indian Rupees only.

10.8. The fellow will meet all other costs including medical insurance etc. from the above fellowship or from his/ her own resources.

10.9. During the tenure of fellowship, an in-service fellow may continue to receive his/her salary, types of leave and benefits etc. from the parent organization as per rules.

11. Bank Guarantee and Service Bond:

11.1 (i) Indian selected fellows shall provide an irrevocable Bank guarantee for an amount of US$ 10,000/- (equivalent in rupee currency) in favour of the Secretary, ICAR. The Bank guarantee should be valid for the entire duration till the successful completion of the programme.

(ii) For foreign national selected fellows, an amount of Rs. 2,00,000 will be recovered from their fellowship grant as alternate of Bank guaranty, in terms of Rs. 1,00,000 each from first and second installment till successful completion of their Ph.D. study programme. This fellowship amount of Rs. 2,00,000 will be paid to the fellow at the time of final release of fellowship".

11.2 The Indian in-service candidates selected for international fellowship shall execute a bond with the deputing University/Institute to undertake to serve that institution after the completion of degree for at least three years.

12 Continuance of the Fellowship:

12.1 The fellow will submit his progress report to the Council, through his/her adviser/supervisor/ head of the institution every six months.

12.2 During the tenure of fellowship, the fellow should neither change the place of work nor deviate from the broad research area for which the fellowship is sanctioned. The selected candidates shall be required to submit an Undertaking to this effect and also for adherence to the other conditions of the guidelines regulating the fellowship as prescribed by the ICAR, with the acceptance of the International Fellowship.

12.3 The fellow will devote his/ her full time for his/ her chosen area of studies/ research work during the tenure of his/ her fellowship.

12.4 Satisfactory progress in studies will be essential for the continuance of the fellowship during the period of study as reflected by the grades secured and certification by the advisor/ supervisor.

12.5 In case of unsatisfactory performance in studies, or conduct probation, the fellowship will be terminated with immediate effect and the fellow will be required to meet the expenditure on remaining part of the programme from his/her own resources.

12.6 This fellowship is not meant for the conduct of training or to carry out research of short duration.

12.7 Research Experiment and data collection at Indian SAUs/Institutions located in India.

(i) The fellows, who are required to put experiments at Indian SAUs/Institutes located in India and data collection from the Indian location, maybe allowed for a maximum period of one-and-a-half-year as per their research plan.

(ii) With the consent of their Advisor and prior approval of ICAR, they may undertake interim visits to India on their own resources. ICAR will not provide any financial support on travelling for the purpose.

(iii) During the stay in India, they will be eligible for fellowships @ Rs. 40,000/- per month plus contingent and preparatory expenses @ Rs. 25,000/- per annum, as the same amount which is offered to foreign national fellows doing Ph.D in India under the scheme.

(iv) The period of absence from host university and stay in Indian university/Institute need to be authenticated/verified by the identified Advisor and Co-Advisor respectively.

13 Medical Fitness:

Selected fellow would be required to get his/ her medical fitness test and medical insurance done at his/her own cost.

14 Payment of Fee:

All fees chargeable by the host institution where the fellow is enrolled will be paid by the fellow himself out of the fellowship grant or from his/ her own resources.

15 IPR Issues:

The fellow is expected to take proper measures to protect the Intellectual Property Rights likely to be generated during his/ her stay in the host institution. The Council will have the appropriate share on the patents/ knowledge generated by the fellow while pursuing the programme as specified under IP Management bulletin. If the fellow enters into any other IP agreement, the same will be appropriately shared with the Council. In all publications arising out of this work, the support from the Council should be duly acknowledged.

16 Completion Report from Netaji Subhas-ICARIF:

Both Indian and Overseas fellows will have to submit within 15 days of their completion of the program, a copy of the dissertation/thesis and a brief report on the activities undertaken including any significant research contribution to the Council.

17 Non-return of Indian Fellows to India:

The Indian Fellows have to return back to India after completion of the Ph.D. degree. If the fresh Indian Fellow is offered a suitable position in ICAR-AU system, he/she shall serve the ICAR-AU system. In case of non-compliance to these provisions, entire amount paid to the Fellow along with 10% overhead cost will be recovered by the Council from the Fellow himself or from his surety, failing which, the Indian Embassy in the host country will be informed to take appropriate action.

18 Budget Head for Expenditure:

The expenditure on the NS-ICAR International fellowships, contingent grant and travel expenses will be met from the Council from the Plan budget-head "ICAR International/overseas fellowships".

19 Review of the Netaji Subhas-ICAR international fellowship Scheme:

The ICAR international fellowship scheme along with the fellowship amount and its guidelines will be subject to periodic reviews, as deemed fit by the Council.

20 General:

20.1 For any clarification regarding the NS-ICARIFs, the Assistant Director General (HRD), Education Division, ICAR, New Delhi may be contacted.

20.2 Secretary, ICAR and Additional Secretary DARE will be the final authority in resolving and taking decision on any situation/case of conflict and his decision shall be binding on all parties concerned.

20.3 For any dispute, the applicable law will be the Indian law under the jurisdiction of Courts in Delhi only.

****

Priority Areas of Study

The Netaji Subhas- ICAR International Fellowships are available in frontier areas of Agriculture and allied sciences at the recognized agricultural universities/ institutions in India and abroad. The identified priority areas are-

Crop Sciences

- Markers and MAS of biotic stress tolerance
- Non-chemical measures for eradication of pests
- Integrated pest management-compatibility with chemicals
- Race and biotype identification of pests
- Molecular basis of pathogenicity and host specificity
- Crop loss assessment models
- Survey and surveillance strategies for pests showing no specific symptoms
- Development of smart biotic stress resilient bees
- Development of novel technologies including standardization of bee hive design to combat attack on bees and colonies.
- Use of acoustics and biosensors for detecting pest infestation
- Molecular signatures of biocontrol agents
- Polymer based smart delivery systems for enhanced seed yield in major crops.
- Nano-particulate seed invigoration for enhanced seed longevity in soybean and groundnut.
- Optimization of seed production and testing protocols in medicinal and aromatic plants.
- Development of self-incompatible hybrid seed production system in mustard.
- Studies on molecular mechanism involved in bio-priming and seed health management.
- Studies on extraction, characterization and application of botanicals for seed quality enhancement.
- Assessment of bioactive potential of seed storage proteins in seed protection.
- Abiotic stresses and its repercussions on seed quality parameters in major crops.
- Quantitative assessment of trade impacts due to seed policy reforms and price policy research in seed sector.
- Genome-wide association mapping (GWAS) for seed quality traits in Maize/Rice
- Trait identification and physiological breeding for abiotic stress tolerance
- Molecular and epigenetic of plant development and stress tolerance
- Bio-markers and non-invasive techniques for diagnosing seed quality
- Biophysical, genetic and molecular basis of seed development, germination, dormancy and longevity
- Expression Genomics and advanced genomic Analysis-Field crops
- Biochemical and molecular basis of drought tolerance in Field crops
- Breeding for Quality Improvement in Cereals and Oil seeds
- Field-based phenomics for plant pathological research and its manipulation
- Crop yield forecasting linking Remote sensing and simulation model
- Modeling water and nitrogen dynamics under different tillage and residue management practices
- Introgression of wild genes in Super rice

- High throughput Phenomics
- High throughput genotyping and analysis: SNP chip development and data analysis
- Improvement of salinity stress (abiotic stress) tolerance in cereals
- Plant Single Cell Genomics, Single Cell Metabolomics
- Molecular breeding for nitrogen use efficiency
- Isolation and characterization and map based cloning of disease resistance genes in field crops
- Identification and Characterization of Bacteriophage for management of bacterial diseases of crops with special emphasis on rice.
- Epidemiology of rice diseases in modern era with special emphasis on False Smut Disease
- Throughput techniques for understanding the abiotic stresses management in millets
- Genomics sequencing for marker developments particularly small millets
- Genetic engineering and genome editing technologies for maize improvement
- Genomic selection based maize breeding technologies
- Double haploids in hybrid breeding
- Allele mining for flagging the useful genes available in the genetic stock for ascertaining the genetic worth of the collection and better utilization
- Development of varieties with genetic enhancement of yield, tolerant to water stress and high temperature, insensitive to photoperiod, low linolenic and high oleic acid, vegetable and food grade characters, high oil content, suitability for mechanical harvesting,
- Exploring the possibility of harnessing heterosis through identification and development of mail sterility and an efficient fertility restoration system,
- Genetic enhancement of germplasm through pre-breeding exercises for expanding the parental base of varietal evolution programmes
- Identification of efficient Rhizobium and other plant growth promoting rhizobacteria (PGPR) and other microbes with multiple traits for plant growth promotion
- Identification of genetic sources for high yield characteristics such as high number of pods, test weight, seeds/pod, high photosynthetic efficiency and better partitioning (harvest index) and QTLs governing these traits
- Identification of QTLs and integration of photo-thermal insensitivity in agronomical superior lines and MAS for varieties with yield and wider adaptability across planting time latitudes and rapid seed fill duration
- Identification of resilient soybean production system for changing climate. Studies on thermo tolerant Brady rhizobium for higher nodulation in soybean. Use of Mycorrhiza fungi in mitigating adverse impact of abiotic stresses.
- Impact assessment of future climate change and development of adaptation strategies to mitigate adverse impact of present and future climate variability
- Management of YMV and rust in soybean though development of resistant varieties and protection modules
- Molecular characterization of available soybean genetic stock for safeguarding country's interests
- Optimization of rotational tillage and crop rotation in soybean based cropping system
- Refinement in IPM by adding of new components for multiple diseases and insects
- Standardization of management practices for organic soybean production

- Use of photo-insensitivity and long juvenility traits for development of soybean varieties with wider adaptability
- Use of zinc solubilizing and iron chelating rhizo-bacteria for zinc and iron nutrition in soybean
- Utilization of molecular tools such as marker aided selection for tracing QTLs for yield and their subsequent exploitation through breeding programme
- Widening gene pool through pre-breeding approaches including restructuring plant type for breaking the existing yield ceiling
- Phenotyping and MAS for white rust resistance and quality traits
- Development of transgenic for *Alternaria*blight resistance and aphid tolerance
- Improving resource use efficiency (soil, plant, water and nutrients) under different situations
- Development of web-based user friendly, bilingual interactive software for speedy technology dissemination
- Reduction in maturity period with improved seed yield in developed genotypes
- Identification of improved methods for estimation of estimation of biochemical parameter developed
- Development of new genotypes having double low characteristics in mustard
- Improvement in resource use efficiency under different situations

Horticulture

- Ecosystem analysis
- Gene silencing and RNAi technology
- Date Palm improvement and culture
- Doubled haploidy (DH)
- Tospo viruses
- Temperate Horticulture
- Phyto-plasma
- Bio-security in horticultural crops
- Pheromones and chemical ecology
- Physiology of flowering and fruiting in perennial fruit crops
- Fruit tree breeding
- Male sterility in crops
- Micro-nutrients in soil health management in horticultural crops
- Mechanization in horticulture
- Quality Parameters in horticulture crops
- Landscape horticulture
- Physiological disorder in horticultural crops
- DNA Barcoding
- Canopy architecture management, Ultra High density orcharding
- Development of pest and disease forecasting models, Development of diagnostics
- Agri-waste utilization, Peri-urban horticulture, organic farming
- Nutrient bioavailability
- GIS & remote sensing, geo-informatics, image processing

Biotechnology and nanotechnology

- Gene knock-down technology
- marker assisted selection (MAS),
- transgenic technology,
- microbial molecular taxonomy,
- molecular breeding
- bio fortification, bio-prospecting, bioremediation, ,non-chemical non-thermal processing and membrane technology,apomixes, stem cell research, nutri-genomics, , bi-economics of effective agro-technologies, Epigenetics and reproduction,
- Nanotechnology applications in agriculture comprising plant, animal and fisheries/ aquaculture sciences etc.
- RNAi Silencing approaches for seed-borne pathogens
- Design and development of nano-biosensors for seed quality assurance and nano-composite based smart seed delivery systems
- Molecular Image Analysis of seed quality parameters
- Cloning of tissue specific promoters
- Understanding molecular basis of plant immunity
- Genomic selection and genome wide association mapping
- Transgenic for insect resistance in pulses and cotton
- Understanding genes involved in nitrogen uptake and assimilation
- Defense response mechanism of plants
- Systemic acquired resistance
- Understanding Molecular basis of CMS across crop species
- Apomixes for hybrid development
- Metagenomics for new gene discovery Development of next generation DNA markers
- Cloning plant disease resistance genes and their application
- Comparative genome analysis and system biology
- Assessment of diversity loss over time and space and approaches to measuring genetic erosion on-farm
- Study of functional polymorphism in plant genetic resources of important crops
- Characterization of germplasm for enhanced utilization using tools of comparative genomics
- Providing scientific basis for seed conservation strategies and for devising effective seed conservation protocols.
- Investigating molecular aspects of seed longevity.
- Investigating seed storage behavior as a prerequisite for storage strategy and factors responsible for recalcitrance in seeds.
- Development of cost-effective *in vitro*conservation and cryopreservation protocols.
- Developing DNA based diagnostics to check unauthorized GM events and to monitor unintentional presence of transgenes in germplasm collections.

Animal Sciences

- Allele mining for disease resistance and adoption in the changing climate scenario
- Veterinary health

- Genome resource conservation
- Fermentation Technology
- Molecular diagnostics and Recombinant vaccines
- Nutra-ceuticals and functional foods
- Bio-security
- Animal Biotechnology and Animal Health
- Dairy production, processing and management and animal biotechnology
- Next generation gene sequencing, Immuno-physiology

Natural Resource Management

- Climate Change: Impact, adaptation, mitigation, Soil Carbon Sequestration, carbon trading/carbon sequestration in agro-ecosystems, methane mitigation in livestock etc.
- Micro-molecules
- Agro-forestry and sustainable Livelihoods
- Water Footprint and virtual water, Phyto-biomediation of waste/poor quality water Soil & water conservation engineering, Conservation of bio-resources and species modeling, Soil microbe interactions for organic matter and nutrient dynamics
- Computer aided designing of implements and processing plants
- Market intelligence, Multi-market modeling
- Research evaluation and impact assessment
- Institutional economics.
- Decision Support Systems
- Arid areas agriculture production

Agricultural Engineering

- Bioinformatics, Bio-environmental engineering, Ergonomics and agricultural safety, Advanced machine design,
- Sensor-based applications including bio-indicators, bio-sensors
- Endophyte biology
- Agriculturally important biodiversity (including fisheries)
- Herbivory process
- Precision agriculture/farming, Hi-tech Horticulture, Aeroponics, Controlled environment agriculture
- Functional foods/Health foods,
- Robotics
- Secondary Agriculture
- Bio-fuels
- Precision Agricultural Machinery
- Use of Drones in Agriculture
- Post harvest management, Food Engineering, Extraction of bio-active compounds, Novel techniques for storage of food grains/food fishes, Processing and value addition, Extrusion processing, Designer fish foods, Value chain management, Smart/modified atmosphere packaging,
- Drip Irrigation

- Water recycling
- Waste Management

Fisheries

- Management of sea water intrusion in inland and coastal aquifer
- Fresh water/Marine/Cold water fish breeding and culture
- Pearl/crab culture, Fish disease diagnosis, vaccines and Immuno-prophylaxis
- Intensive aquaculture (cage culture, raceways)
- Organic/ornamental aquaculture, Fish food formulation, FCR & flesh quality enhancement
- Food safety and quality assurance, HACCP&GMP in Fish processing
- Marine Fisheries Resources/ Stock Assessment, conservation and Management, Population Dynamics and Stock Assessment Models
- Mari culture & Open sea Cage farming of finfish/shellfish and sea-ranching
- Inland Fisheries Resources/Stock Assessment, Population Dynamics & predictive modeling, Conservation and Management
- Quantification of environmental flow in rivers for management of eco-system, health & fisheries
- Culture based fisheries management of reservoirs
- Fresh water Aquaculture-finfish/shellfish hatchery & grow-out culture and farm management
- Shrimp hatchery & grow-out culture and farm management
- Selective breeding of finfish/shellfish species for growth improvement and disease resistance
- Fish health management, Disease Diagnostics & Control Measures in aquaculture
- Nutrition and fish feed technology
- Probiotics/Nutraceuticals/Immuno-stimulants in aquaculture
- Integrated fish farming systems with Crops and Livestock
- Utilization of sub-soil saline groundwater of aquaculture
- Hatchery Technology and Grow out Culture of Trout and other Hill Fishery Resources
- Fishing craft and gear designing, fabrication, improvisation for diversified and conservation fishing in artisanal and mechanized sectors
- Fish Processing; Product Development, value addition & waste utilization; Food Safety, Quality Control& Hygiene Protocols; Packaging Technology

Note: The other frontier areas in agriculture and allied sciences may also be appropriately considered.