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Ethics in Research Publication

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Preface

We are at the beginning of a modern knowledge revolution in the world. Our development as knowledge-based economy is being accelerated by the rapid advances in science and technology. Technological disruptions and fast changing scientific ecosystem are raising the questions of ethics, privacy and trustworthiness. The contributions in the field of science, technology and innovation and their impact is primarily measured by Research Publications. Increased importance of research publications, impact factor and citations as metrics in evaluating science and assessing the quality of research is driving unethical practices in research and publications. Adding to that, limited access to research publications, exuberant subscription charges, heavy article processing charges and several other transboundary science and technology issues are further dividing the scientific community which is severely impacting the progress of the Nation.

Globally, there has been a significant effort to synergize and expand access to scholarly scientific knowledge. Under the G20 Presidency, India has initiated a flagship program “G20 Chief Science Advisers Roundtable (G20-CSAR)” and held series of high-profile side events to synergise global efforts to expand access to scholarly scientific knowledge.

I am delighted that in the midst of these developments, National Academy of Agricultural Sciences (NAAS) organized a brainstorming workshop on ***“Ethics in Research Publication”***on August 31, 2023. The main objective was to seek inputs from various stakeholders representing researchers, faculty members, editors, publishers and policy makers to enable a positive research and publication ecosystem in the country. I thank the Convener Dr.G. Taru Sharma for taking this initiative, Dr.E.V.S. Prakasa Rao andDr. Akhilesh Kumar Tyagifor reviewing the paper and to all the eminent participants for their valuable inputs. I also take this opportunity to thank Dr. V.K. Baranwal and Dr. R.K. Jain for their editorial support. I hope the researchers, policymakers and other stakeholders will find this document useful.

September 2024
New Delhi

(Himanshu Pathak)
President, NAAS

Ethics in Research Publication

1. INTRODUCTION

The world is witnessing a knowledge revolution resulting in integration of science, technology and innovation. Science lays the key foundations for understanding of the universe and society. Rapid developments in science and technology are accelerating economic and intellectual growth of society. Advancement in science and technology has enabled a large percentage of global population to come out of extreme poverty, meet the food and nutritional needs while ensuring the wellbeing of mankind. However, technological innovations like artificial intelligence (AI) and machine learning are also creating disruptive changes in societies at a larger scale and much faster pace. Some changes are anticipated and can be easily addressed;however, several unpredictable unknowns are difficult to be navigated. This raises questions of ethics, privacy, and trustworthiness.

Science,Technology and Innovations ensure nation building and societal development globally, which are interconnected. Research is the most important and fundamental activities of human society and has been responsible for almost all the technological and economical advances that are witnessed now. The contributions in the field of Science and Technology (S&T) and their impact is primarily measured by research publications. The researchers, scientists, faculty members, students, industry personnel and academicians mainly target to showcase their work and achievements by publishing in high impact Journals. The impact factor of journals and citations of publications are driving the scientific community to publish their research work/innovations. This is resulting in emergence of new journals and publishers with different options like open access, publish as pre-prints, arXiv-free distribution, etc.

Increased importance given to publications, impact factor, citations, h-index, i-10 factor, field-weighted citation impact (FWCI), etc. by several academic/research institutions, universities, recruitment organizations, and agencies installing awards is driving some section of researchers to indulge in unfair practices to publish their work. In a few cases, professional and scientific ethics are compromised in-order to publish research work in high-impact journals to receive greater recognition. However, high impact publications are not necessarily translated into technology for societal good in all cases and publications either remain a source of knowledge advancement or, in a worst scenario are made for the sake of numbers only.

There has been a continuous effort by various intergovernmental fora and multilateral groupings to discuss the issues of global S&T policy and governance, to provide direction and to shape priorities of scientific knowledge creation and their use. In view of synergizing efforts to expand the access to scholarly scientific knowledge under a fast-changing publishing landscape around the world, a relook into how the research is conducted, published and communicated is discussed in this document.

2. RESEARCH &DEVELOPMENT: INDIA VS. WORLD

Globally, academic publishing is facing hurdles of diversity and equality. On an average, 0.38% of Gross Domestic Product (GDP) is spent on Research & Development (R&D) and there are 713 researchers per million population in global south relative to 1.44% of GDP expenditure and 4,351 researchers per million population in the global north. Between 2015 to 2022, approximately 4,000 manuscripts are published by a country in the southern part compared to 35,000 in northern part of the world. The G20 countries produce approximately 85% of the world's scientific knowledge. Only 2% of the topmost cited articles originate from southern countries (cactusglobal.com). However, economic progress of a country is related to the efforts of funding good publication, incentives and processes.

For India to be acknowledged as a science and technology power, a large amount of highly impactful research should originate from this country. Good research will result in good publications and hence India should upgrade science standards. However, India compares unfavourably with the world's best on R&D expenditure as percentage GDP expenditure shows declining trend over the past decade. Currently India spends 0.64% of its GDP on R&D (all public plus private) (Research & Development Statistics at a Glance, 2022-23). Top ten countries with maximum expenditure on R&D as percent of GDP include Israel (5.35%), Korea (4.8%), Sweden (3.49%), Belgium (3.46%), USA (3.42%), Japan (3.27%), Austria (3.19%), Germany (3.11%), Denmark (2.97%) and Finland (2.91%) (UNESCO Science Report, 2021). In the year 2020-21, 6,232 doctorates were awarded in science and 5001 in engineering and 61,573 patents were filed in India. During the same period, 200 doctorates in Veterinary sciences, 1793 in Agriculture and 1757 in Medicine were also awarded (R&D Development Statistics at a Glance, 2022-23, DST, Govt. of India). There are 3,61,924 scientific staff in R&D institutions in India. Large number of institutions and scientific staff in India are struggling to keep pace with global developments in the area of academic publishing. Composition of editorial team having members from few select countries leads to biased reviewing process in many cases. This has resulted in inequality among research community wherein researchers from few countries could publish maximum number of manuscripts in the journals. Unfair practices are prevalent among students and researchers to publish their work for the sake of publications. Hence ethics in research publications need to be addressed to protect the interest of all the stakeholders while synergizing efforts to expand access to scholarly scientific knowledge.

2.1. Scientific Frauds in Publishing

Scientists carryout research, serve as editors and peer reviewers and also in some cases pay a huge sum of money to publish their research. While funding organizations pay for research and also pay article publication charges, the ownership of the research work finally rests with publishers who makes lot of profit. In a nutshell, the research output, which emanates from public funds is owned or controlled by private publishers/commercial companies. Recent years have witnessed the transformation

of printed copy/hard copy of journals into digital platform, open access models, high subscription costs and article processing charges (APC).Integration of artificial intelligence (AI) enabled tools into publication industry has resulted in digitization with minimal human inputs thereby reducing the production costs. However, publishers are indulging in exorbitant subscription charges and APC which is unjustified and prevent equitable access to knowledge. This is resulting in under representation of certain regions, restrictions on dissemination of science, disadvantage among less resourced researchers/institutions. Finally, researchers, institutions and countries do not have any control or ownership.

The conditions of unethical practices in India are of diverse origins. On the one hand, there are cases of wilful adoption of unethical practices, and on the other hand there are cases of sheer ignorance whereby, for example, many assume that copying from a web source is legitimate. Money and official status also play a major role in such matters (Muralidhar *et al*., 2019). Trustworthy science is based on reproducible and verifiable results. Research institutions, agencies and funders should have a mechanism to evaluate the authenticity and quality of the research before disseminating the same through publications. The publishers should have a system to identify various frauds like fudged data, incomplete experiments, inappropriate results, morphed photographs and low quality of the overall papers before publishing. However, open access and APC are driving publishers to publish low-quality research work. For example, in the year 2019, 31% of all journal articles are available as open access and by 2025 it is estimated that 44% of all manuscripts published will be in open access. Is this transition helping the research community?

In many of these open access/predatory journals, the percentage of rejections are very low and papers are accepted and published within a very short or no review process. This is resulting in students/researchers to publish poor quality research work or insignificant work in open access/predatory journals through payment. At the same time publishers are indulging in unfair practices to enhance the impact factor of their journals and improve the citations. Some of these developments in academic publishing are resulting into malpractices and encouraging fraudulent activities and these are not sustainable. When the research is carried out ethically, it provides lasting pleasure and utmost satisfaction. Short-cuts that are adopted to achieve few quick honours/ recognitions may harm the researchers in the long run while also impacting and creating wider implications in mis-directing efforts of other researchers with unwanted consequences.

2.2. Peer Review System

The publishers and editors are finding it highly difficult to handle huge number of manuscripts being submitted for publication. The global pulp and paper market was valued 351 billion dollars in 2021 and it is expected to reach 373 billion US$ by 2029, market size in Asia Pacific accounted for US$ 179 billion in 2023 (Source: https:// www.fortunebusinessinsights.com/pulp-and-paper-market-103447).Initial quality check,

authenticating the validity of the experiments, photographs, number of replications, bioinformatics and statistical tools are becoming challenges for peer review process. Sophisticated AI-enabled tools are being used to generate plausible scientific data. Use of automated tools to screen all papers submitted to scientific Journals for tell-tale signs and use of meta science to diagnose problems in research practice are being implemented to improve publishing efficiency. However, these tools are flagging authors with non-Institutional e-mail IDs as fraud and 44% genuine papers as fake, while able to detect faulty experiments. Publishers are developing new software to hunt for pilfered text that are reworked to avoid plagiarism checks. Newer tools and crowd funded detectives are being adopted for catching manipulated images in scientific papers. Scientists and policy makers should have a stake in the process of conducting science and dissemination. Open science for shared scientific future including immediate open access requires, minimal/no APC, inclusive and fair practices, open peer review system, multi-lingualism and access to all stakeholders.

2.3 The Future of Open Access

As on 2019, 31% of all journal articles were available as open access (OA) and received 52% of article views. By 2025 it is expected that 44% of all journal articles will be available as OA and comprises of 70% of article views (Piwowar *et al*., 2019). Open access is categorised into following three types:

GREEN	Author accepted manuscripts are archived online and are freely available
GOLD	Authors pay article processing fee (APC) for OA
DIAMOND	No fee and immediate open access

Alternatives to open access include:

- **Research Gate:** Uploading the accepted manuscripts into Research Gate
- **Sci-Hub:** Encouraging Sci-Hub like platforms wherein author accepted manuscripts are available for free download
- **Research Square:** Platform wherein manuscripts were published as pre-prints and are available online for free
- **arXiv:** Platforms for free distribution and open access archive

3. ISSUES

3.1 Research Ethics

Research ethics involve the application of fundamental ethical principles to research activities which include the design and implementation of research, respect towards

society and others, the use of resources and research outputs, appropriate scientific conduct and the regulation of research. Scientific publication ethics include four important attributes: 1. Confidentiality and transparency, 2. Consistency and integrity, 3. Competence and beneficence, and 4. Non-discriminant and responsible conduct. Unethical research involves scientific experiments (plagiarism, data fabrication, data falsification and conflict of interest); human resource (authorship); subjects of experimentation (human and animals); post experimentation (predatory journals).

Institutional pressure to publish and obtain grants or contracts, career ambitions including pursuit of fame, poor supervision of researchers, students and trainees and self-deception are some of the reasons that result in unethical research. These misconducts result in withdrawal or correction of all pending and published papers and abstracts leading to reprimanding and removal from project, salary reduction and dismissal, restitution of funds to the granting agency, ineligibility to apply for research grants for years and end of the research career. Such unethical research practices may be combated by avoiding biasness and remaining open to criticism and new ideas while maintaining good records and acting with sincerity. Honoring patents, copyrights, and other forms of intellectual property, protecting confidentiality, avoiding wasteful and duplicative publication, appraising and motivating early career researchers to adopt ethics in research and publication, obeying the relevant laws and institutional and governmental policies, and developing and adopting penal mechanisms for science/ publication mis-conduct will all ensure to minimise the unethical research practices.

3.2 Publication Ethics

Since there are huge career pressures to publish research outputs, unethical behaviour on the part of authors, journal editors, peer reviewers and publishers is unfortunately becoming more noticeable in recent times (National Academy of Sciences, 2009). Misconduct in scientific publications may involve data fabrication/falsification, poor study design, plagiarism and self-plagiarism, favourable data analysis, unjustified authorship, redundant publications, inappropriate ethical approvals and undisclosed conflicts-of interest. These unethical practices in publications may happen as a result of unawareness about research and publication ethics, publication pressure, career and funding pressure, commercial conflict of interest, inadequate training and poor standards of mentoring. Misconducts in publication results in misleading information to community, loss of funds, time and reputation, professional disaster for medical practitioners, loss of public trust in research, erroneous government policies and above all these manuscripts will be unsafe for society and humanity.

Over the years, a couple of critical issues have been identified which could be avoided in scientific publishing. These includes, duplicate manuscripts/data slicing, redundant/ salami publications, plagiarism/data theft along with data manipulation/falsification, animal and human use concerns. The Committee on Publication Ethics (COPE) has published very comprehensive guidelines on ethical practices expected of authors,

editors, reviewers and publishers (https://publicationethics.org/resources/guidelines). Some general guidelines(COPE, 2022) on ethical practices that should be followed in the course of a publication are discussed here.

3.2.1 Responsibilities of an Editor

Editor has the following responsibilities before processing of any manuscript:

- Does the manuscript fit into the scope of the Journal?
- Does the manuscript adhere to “Information for authors” guidelines?
- Is it a review/research paper or short communication?
- Is the abstract concise?
- Does the manuscript provide novelty or sufficient new information?
- How the work reported is different from the prior published papers?
- Is the reported work important to researchers in the specific field?
- Does the paper cater to the readership of the Journal?

3.2.2 Responsibilities of a Reviewer

Reviewer should be mature enough to understand the requirements of the editor, author and the reader. They should be an authority in the concerned field and should have passion and sufficient time to review the manuscripts.

- Reviewer should notify the editor if they are unable to review the paper and may suggest alternate reviewer.
- Reading the complete manuscript including figures, tables, data, and methods as well as the supplementary material, if there is any.
- Reviewer report should critically analyse specific sections and the key concepts presented in the article and the manuscript as a whole.
- Reviewer should consider the originality and the novelty of the work rather than just looking into state-of the art techniques or tools used in the study.
- Ensure that the methodology and analysis are provided in detail without repeating already published information which will allow the reader to judge the scientific merit of the study design and be able to replicate the study.
- Ensure that the article cites all relevant work.
- Reviewer should provide his comments in detail to enable authors to properly understand and address the points raised.
- Reviewer should not recommend to cite their own paper or papers of their co-authors or colleagues or from the journal they are associated to increase the citations unless it is highly relevant.

- Reviewers should avoid derogatory comments and shall maintain a neutral tone and should provide constructive criticism to improve the quality of work.
- The authors name, their affiliations, laboratory they belong to and the place of work should not influence the decision of the reviewers.
- Use of AI or AI-assisted tools (such as ChatGPT) to review submissions or to generate peer review reports should be strictly avoided.
- If the review report does not meet the Journals quality standards, the reviewer should be asked to revise the report, or the report may be discarded.
- Maintaining the confidentiality of the review process.

3.2.3 Responsibilities of a Publisher

- Publishers should think beyond the impact factor and citations of the journals. Overall contribution of the journal to improve the scientific knowledge in the specific area should be the goal.
- Should ensure unbiased review process.
- Should constitute the editorial board which will have balanced representation from global north and south, developed and developing countries and inclusion from all continents and languages.
- Chief editor should be an accomplished and highly respected scientist within the field.
- The names, affiliations, place of work will have influence on editor/reviewers' decision-making process and hence considering the blind reviewing may be a better option.
- The page charges for open access journals should be reasonable and there should be logic in fixing page charges.
- Publishers should ensure that chief-editor, editor or editorial board members of a particular journal follow the same review process.

3.2.4 Responsibilities of Authors

Editors and reviewers are equally busy like authors and hence, authors should make it easy for the editors to understand and decide about the suitability of the paper. Manuscript planning should begin before authors start experiments and should have the following.

- Knowing the audience/readers
- Use less to convey more
- Use an outline to organize ideas and prepare a well-articulated abstract

- ✦ Tables and figures should be stand-alone and should provide information for easier understanding by the readers
- ✦ Focus on ideas and write the results interpretation without repeating tables and figures
- ✦ Make appropriate strategy for discussion to highlight the novelty
- ✦ If the manuscript is too large, break into parts and work on the parts
- ✦ Choose the journal within the scope of the work, which is most visited and has target audience
- ✦ Obtain consent of all co-authors, avoid gift authorship and include only those who contributed to the work

3.3 Metrics to Evaluate Scientific Contributions

Research should enhance the intellectual and economic growth of society. High impact publications are not necessarily translated into technology for societal good. Hence, while assessing scientific contributions even though impact factor and citation-based metrics are important, it is time to move away towards more holistic assessment. It is therefore, necessary to evolve research evaluation methodology considering holistic contributions of researchers. Also, there is need to consider the merit of the work and societal impact independent of venue of publications. Existing metrics majorly includes impact factor and citations in addition to H-index, i-10 index, G-index, FWCI and Altmetrics, etc. In addition to these metrices, it is suggested to consider fundamental contribution with a high quality basic science, transdisciplinary collaborations for complex challenges, research impact to socio-cultural, environmental and economic wellbeing and the needs of all sections of society. The research findings which came out of collaborative efforts with Industries and how fast can the work be translated into technology or the research which goes to society immediately may be an important criteria in evaluating its merit. Basic research should be targeted to enhance the intellectual knowledge, however, the applied research should be aligned with National Development Goals and UN's-SDGs. The leadership in research should consider using different metrics to assess the scientific contributions of researchers.

4. RESPONSIBLE RESEARCH AND PUBLICATIONS

It is important to realize that creating and enforcing regulations provides a minimum level for ethical behavior. However, scientists should not create a culture of regulation, but a culture of conscience. The originality of research work, research design based on strong rationale, concept of high merits, scientific rigour and appropriate controls, methodology disclosure and appropriate ethical approval should be adhered by researchers. It is also important to consider transparency in data storage, traceability and availability. While writing the manuscript, authors should consider to avoid data falsification,fabrication,image manipulation, plagiarism, self-plagiarism, self-citation,

and overestimating the data in favor of own concept. Authors should also ensure availability of raw data, use of justified authorship and affiliation, providing realistic author contribution statement, not indulging in redundant publications, disclosing conflict of interest, adhering to journal guidelines, publishing in good society/Impact factor/ quartile journals, disclosing the use of AI or AI-assisted technologies in manuscript preparation, disclosing the use of subjects (humans/animals/plants/cell lines). Post acceptance, authors should follow to respect the embargo period of the subscription journals, avoiding sharing pdf copy of accepted article at social media platforms.

5. IMPROVING THE PUBLISHING STANDARDS OF INDIAN AGRICULTURAL & ALLIED JOURNALS

After the advent of internet, there has been a digital transformation of the knowledge resources, however, the subscription costs of online journals are still as high as in the print era of publications and access to them is available to a limited section of society. Further, Article Processing Charges charged by many foreign journals are exorbitant, as high as 10,000 USD per article. Under the fast-changing global publishing industry, developing country like India is plagued by massive outlay for subscriptions and yet limited access and also overlapping of subscriptions from different Scientific Departments is a concern. Added to these, APC to be paid by the authors to make their work open access is an additional burden. To enable universal access to scholarly scientific literature, under Aatmanirbhar Bharat it would be appropriate to strengthen our own Indian Journals to compete globally in the long run. In this regard, NAAS rating of Agri-journals has been a progressive step and NAAS should continue to upgrade its evaluation mechanism. The Professional Association of Agricultural Societies (PAAS) and NAAS partnership in upgrading of publications in Indian society journals should be encouraged.

Communication of research results is a central element in conducting science; in fact, there is little reason to do scientific research if the results are not shared with others in the community. Large number of scientific journals published in India shall play a pivotal role in disseminating the research findings among the millions of students and scientific community to break the barrier and providing access to scientific knowledge. However, challenges lie ahead to balance the advantages of the tried-and-true means of journal publication with the possibilities of becoming available for a vastly increased audience of computer-literate individuals. However, less user-friendly submission portal, lower impact factor, lack of indexing by global agencies, poor citations, lower cite-score, lack of participation from international reviewers/authors and many other factors are discouraging Indian researchers to publish their best quality work in local journals. This has resulted in publication of poor-quality research and lower standards of majority of Indian Journals. To a large extent, scientific community from elite institutions are happy publishing their research work in some of the best journals abroad. There are meagre efforts from scientific leaders and outstanding scientists to build a strong scientific publication culture within India. Improving the quality and publishing standards of

Indian journals on par with global journals should be considered in order to address the monopoly and biased opinion of select few global publishers or countries who have major stake in these publications. Enabling immediate and universal access to publicly-funded scholarly scientific knowledge and ensuring "One Nation One Subscription" may be realised by promoting the local Indian journals. Few suggestions have been listed below to improve the publishing standards of Indian journals, especially agriculture and allied subject journals.

- Time-bound peer-review process.
- Time-bound publication process (proofs, editing, and pre-print, and final article available online).
- Exceptionally dedicated team of researchers in Editorial/Review Board.
- Rigorous peer-review process.
- Frequent "call for papers" issues in cutting-edge areas.
- Invite reviews/status report in lead/emerging areas from leading experts.
- Invite experts to contribute an issue in honor of legendary Indian/foreign researchers.
- Quality of printing and design of the article should be comparable to the best of the journals of the field.
- Funding agencies (such as DBT, ICAR, ICMR, DST, etc.) should mandate Indian journals to provide free access of the research work supported by their funding.
- Indexing Indian journals in PubMed, Scopus, ISI Web of Science etc.
- Indian science academies and other science ministries should also take appropriate steps to better disseminate the journal content.
- Indian journals should have free e-subscription.
- Indian journals may have social media account to display recently published important articles.
- Journal website should be made more attractive – have information like Editor-in-Chief, Editorial Board, ISI/NAAS Impact factor, 2-year/5-year citations and cite score etc.
- At the website, provide average time of publication (from submission to acceptance) and average acceptance percentage.
- Website with a clear navigation of "Guideline for authors on manuscript preparation".

Proposed Solutions

- Existing guidelines available at ICAR institutes and Agricultural Universities on ethics in publication should be reviewed and necessary improvement or changes in the guidelines may be made after consultation with experts.

- Ethical guidelines for publishers, journals, editors and reviewers may be developed.
- Scholarly journals and publishers to adhere to COPE guidelines for retraction of the manuscript or publishing“erratum” or “expression of concern” depending on the severity of unethical misconduct.
- Ethical parameters and publishing policies shall be included in all NAAS-rated journals.
- The societal impact of the publication addressing major national initiatives and common good should be given due importance.
- The guidelines related to minimum number of publications mandatory for Masters and Doctoral degree awards should be re-evaluated.
- Reduce the emphasis on publication counts which will discourage the growth of “predatory journals”.
- Training programmes should be conducted by ICAR-NAARM for scientists/ teachers regarding ethics in research publication. Similarly, Directors and Vice-chancellors should be sensitized about the same during the Executive Development Programme.
- In ICAR institutes, any research publication is communicated to Performance Monitoring and Evaluation (PME) cell before submission to the journal. Similar model should be developed for all the Agricultural Universities and other institutions.
- A separate budget should be allocated for the researchers through project funds (particularly extramural project) to submit their research work in peer-reviewed open access journals.
- Pre-print archives (arXiv, Research-square) may help in curbing ‘idea plagiarism’ that can happen in the process of conventional publication in peer-reviewed journals.
- The publishing standards of Indian journals can be improved by free e-subscription, time bound review/publication process, diversity in editorial board.
- Massive open online courses (MOOC) about predatory publications/Journals and fraudulent practices may be designed.
- Publication policies should be displayed on university/institutional websites.

Policy Options

- “Ethics in science” should be made part of curricula. Effective training of enthusiastic young researchers in good ethical practices should be organized in addition to training in their chosen disciplines.
- Increase allocation of the annual scientific research budget on quality control of research and academic publishing.

- ✦ Establish quality control system to assess scientific quality and publications.
- ✦ Over-reliance on impact factor and citations should be reduced for assessing the scientific achievements.
- ✦ Develop research evaluation methodology considering holistic contributions of researchers: merit of the work and societal impact independent of the venue of the publication.
- ✦ Provide incentives and financial assistance to selective Indian Journals/local publishers with a good potential to improve their standards and quality.
- ✦ Take necessary measures to support the development of science as a public good.
- ✦ Make science more connected to societal needs. Identify the priorities of scientific knowledge creation and its use.
- ✦ Identify major problems in agriculture and allied sciences.
- ✦ Encourage One Nation-One Repository-One Subscription and remove barriers in science.
- ✦ Creation of National repository/database of scholarly publications which should be freely available to all the stakeholders.

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Policy Papers

71.	Role of Root Endophytes in Agricultural Productivity	2014
72.	Bioinformatics in Agriculture: Way Forward	2014
73.	Monitoring and Evaluation of Agricultural Research, Education and Extension for Development [AREE4D]	2014
74.	Biodrainage: An Eco-friendly Tool for Combating Waterlogging	2015
75.	Linking Farmers with Markets for Inclusive Growth in Indian Agriculture	2015
76.	Bio-fuels to Power Indian Agriculture	2015
77.	Aquaculture Certification in India: Criteria and Implementation Plan	2015
78.	Reservoir Fisheries Development in India:Management and Policy Options	2016
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