



Indian Phytopath News

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From President's Desk

Challenges of microbial consortium technology in disease management

Microbial consortium of efficient strains for biological control help in improving microbial efficacy, reliability and consistency under diverse soil and environmental conditions. Different species in consortial formulation occupy varied niches in the root zone thereby restrict competition among them. Potential of consortial application of bioagents against fungal, bacterial and nematodes can be utilized to fullest extent by selecting most potential strains and not by arbitrary use of consortia. Therefore, microbial consortia are replacing the use of single microbe in crops. The additive and synergistic effect of microorganisms in consortium for growth promotion and triggering of defense systems, metabolic pathways against pathogen have been reported. The study on host response to such microbial effects is in continuation. The outcomes of microbial consortia used till now to protect crop plants against numerous plant pathogens. The possible research findings are explained for disease reduction when a microbial consortium is used, comparison of use of single microbe and in small microbial consortium, possible limitations in achieving desired product from the introduced consortia, and the justification for development of an operative microbial consortia which can induce enhanced systemic resistance. Further there is great importance of microorganism in a consortium as they help in increasing efficiency, dependability and magnifies the consistent character of microorganism under soil condition and surroundings. Microbial strains which are compatible with other microorganism and does not have any suppressive or inhibitory effect on strains, other microorganism when they are co-cultured in a common media in consortium, can then promote growth of



IN THIS ISSUE

From President's Desk	01
Editorial	02
Research Highlights	02
Awards/Honours/Promotions	03
Books Published	04
IPS Activities	05
Editorial Board - Newsletter	07
Advertisements	08

plants or may suppress diseases. There are various positive factors of using variety of microorganism in a consortium as they may increase the efficiency of BCAs due to the nature of occupying different surroundings in the rhizosphere and thus are able to decrease competition among them. Further, enhancement of suppressing types of diseases is also regulated by a variety of biological controlled mechanism that are offered by an individual microorganism component. The popular microbes such as Trichoderma, Metarrhizium, Beauveria, Paecilomyces, Glomus, Rhizobium, Bacillus, and Pseudomonas etc. are the basic microbes used in developing consortium of microorganisms. There is a paradigm shift from the earlier investigations which involved single microbe use. In natural environments, several microorganisms live in communities and some of them have mutual beneficial interactions and provides beneficial effects to plant.

Last decade number of consortial bio formulations were evaluated against various crop diseases. It is observed that use of several biocontrol agents having different mechanism of disease control satisfy the norms of integrated pest management, in which number of methodologies for disease suppression applied simultaneously. The benefit of such concept is that if one or other mechanism is not effective, the other mechanism can compensate the absence of former. Although it is equally important to have efficacy

of consortia of biocontrol agents for pest suppression, at the same time it is necessary to learn how the consortia influence plant metabolism and molecular mechanisms of such interaction. More efforts are needed to identify compatible strains of biocontrol agents which can positively influence the host physiological and transcriptional regulations for development of potent and cost effective commercial consortial bioformulation. Also, there is need to develop methodologies to assess probable impacts of the consortia on host plants through synergistic acts of the microbes. Hence, to get benefit from microorganism, plants must identify between different microorganisms and start their respective mechanism to keep the pathogenic or unwanted species of microbes away and attract the beneficial or wanted species of microorganism.

The biggest challenge for the academicians, researchers, students, entrepreneurs is the commercialization of the technologies after investment into such projects. Individually the microbial strains are registered but if used in consortium as a formulation. There are no such regulations on this specific technology. There is an arduous situation where we really need to understand the concept of bio protection and impress upon the acceptance of the research for the benefit of farmers, so that the efforts in research are not wasted.

Pratibha Sharma
President
Indian Phytopathological Society

Editorial

Plant Pathology requires multidisciplinary approaches to meet challenges of food security and safety

Plant Pathology is the study of plant diseases and pathogenic agents across a diverse range of environments affecting agricultural & horticultural crops and forest trees. The current concepts in plant pathology which have given us the understanding on the development of the disease needs to be revisited taking multidisciplinary approach.



The basics of plant pathology such as “disease triangle”, “the disease life cycle”, and “Koch postulates” need to be relooked into and redefined taking into consideration crop agronomy and ecosystems as plant pathology in real terms is the integrated study of all the factors that influence the interactions between plants and microbes and their outcomes both spatial and temporal; and how these can be managed towards a beneficial level. Other disciplines linked to Plant Pathology are plant breeding, crop management, food safety and security, Phytosanitary regulation, soil science, plant and environmental health. Therefore, system biology approach is needed to understand Crop Protection holistically. Climate change and international biosecurity associated with trade and air travel are the global challenges impacting society. Hence, a forum for communication of research findings related to these global issues from the molecular and ecological interactions among plants, pathogens, other microbiota, and vectors, to etiology and epidemiology of diseases in field populations and diverse landscapes, is essential if these challenges are to be met.

Rashmi Aggarwal
Chief Editor, IPS Newsletter

Research Highlights

Microbial consortium for the management of soil borne pathogens of Cucumber under Protected cultivation

Rekha Balodi* and Satyendra Singh
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Integrated Pest Management (IPM) in Cucumber crops grown under protected cultivation (area 3650 m²) was undertaken in farmers' participatory mode at Sonipat, Haryana. Native isolates of *Trichoderma harzianum* (TH), *Pseudomonas fluorescens* (PF) and *Bacillus subtilis* (BS) isolated from soil of the polyhouse were found compatible to each other and effective against soil borne pathogens *Rhizoctonia solani* and *Fusarium* spp., undiluted culture filtrates of bioagents caused 100% mortality against *M. incognita* and inhibit its egg hatching up to 75%. *M. incognita* eggs were also found

infected (up to 89%) when exposed to fresh culture of *T. harzianum*. Further, these bioagents were tested separately and in-combination *in vivo* in cucumber crop under protected cultivation system (2018-2020). The bioagents in combination exhibited maximum suppression (up to 90%) at the end of second season trial. The consortium may be used as an alternative to harmful chemicals for the management of soil borne pathogens.

(Source: doi:

<https://doi.org/10.1016/j.biocontrol.2021.104569>,

<https://doi.org/10.1007/s42360-021-00368-6>)

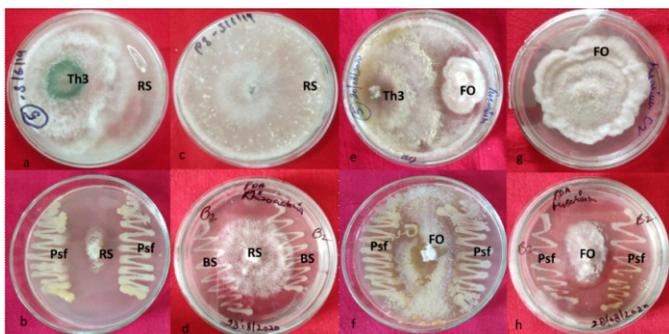


Fig. 1. Confrontation assay with bio-agents, *Trichoderma harzianum* (Th3), *Pseudomonas fluorescense* (psf) *Bacillus subtilis* (BS) with *Fusarium oxysporum* (FO) and *Rhizoctonia solani* (RS) (a) Th3 with RS, (b) psf with RS, (c) BS with RS (d) RS control (e) Th3 with FO, (f) psf with FO, (g) BS with FO (d) FO control

Emergence of poleroviruses and criniviruses affecting horticultural crops in India

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Though the production of horticultural crops in the country has increased significantly over the past few years, viral diseases continue to pose serious threat due to the emergence of newer viruses in the continuously changing cropping patterns as well as the open trade and travel. These viruses could not be characterized due to the lack of application of modern NGS-based diagnostic tools and therefore their management has also not been attempted. In India, viruses belonging to Geminivirus-, Potyvirus- and Tospovirus groups have emerged as serious pathogens on horticultural crops. In addition, the association of Criniviruses and Poleroviruses affecting vegetable crops has been recorded. Efforts in this direction have

also been initiated under the ICAR funded Emeritus Scientist Project at the Advance Centre for Plant Virology, Division of Plant Pathology, IARI, New Delhi. During the survey conducted at IARI experimental farm in 2019, the association of aphid transmitted polerovirus, cucurbit aphid borne yellows virus (CABYV), was established in bitter gourd & cucumber (Fig. 1a,b) (Kumar et al., 2021a). Similarly, a whitefly transmitted crinivirus related to cucurbit chlorotic yellows virus (CCYV) was also detected in pumpkin plants grown at IARI experimental farm in 2020 (Fig. 1c) (Kumar et al., 2021b). Besides, few more plant viruses related to the genus Polerovirus and Crinivirus are also found infecting different cucurbit, lettuce and cumin hosts originated from the fields of New Delhi, Uttar Pradesh and Rajasthan states in 2021 (Kumar et al.; In press). These viruses need to be characterized and their distribution profile will have to be ascertained in horticultural crops. In fact, there is an urgent need to strengthen research work on virome analysis so as to identify the emerging and re-emerging viruses and develop preparedness to save the vulnerable crops before being hit by these viruses.

(Source: <https://doi.org/10.1007/s13337-020-00645-4>; <https://doi.org/10.1094/PDIS-07-21-1473-PDN>)



Fig. 1. Symptoms of cucurbit aphid-borne yellows virus (CABYV) infection on Bitter melon (a,b) and Cucumber (c,d) plants

Awards/Honours/Promotions

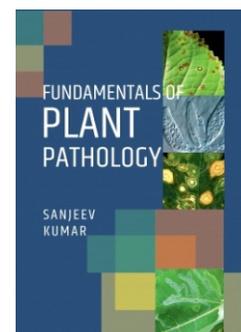
- **Dr. P.K. Chakrabarty**, Member (Plant Sciences), ASRB, has been conferred upon “Prof. S. Kannaiyan Memorial Award-2021” by The National Academy of Biological Sciences, Chennai. Few prominent awardees include Dr. R.S. Paroda, former DG ICAR,

- Dr. Kirti Singh, former Chairman ASRB, Dr. Mahadevappa former Chairman, ASRB, Dr. R.R. Hanchinal, former Chairman, National Biodiversity Authority, Gol, Dr. K.P. Viswanatha, former Vice Chancellor, MPKV, Rahuri, Dr. A.K. Srivastava Member, ASRB, etc.
- **Dr. Kalyan K. Mondal**, Principal Scientist, Division of Plant Pathology, ICAR-IARI, New Delhi was awarded Fellow 2021 of ARRW (Association of Rice Research Workers), ICAR-NRRI, Cuttack, Odisha for his remarkable contribution in the field of Rice Pathology.
 - Based on contribution **Dr. Abhay K. Pandey**, Department of Mycology & Microbiology, Tocklai Tea Research Institute, North Bengal Regional R & D Center, Nagrakata, Jalpaiguri, West Bengal to the "Plant Disease" Journal, this year he was awarded as "APS-Global Membership recipient" by the American Phytopathological Society.
 - **Dr. B. Parameswari**, Senior Scientist, ICAR-NBPGR Regional Station, Hyderabad selected as General Secretary of Plant Protection association of India, Hyderabad for the period 2021-23.
 - **Prof. Rajendra Gade**, took over the charge of Director of Extension Education at Dr. Panjabarao Desmukh Krishi Vidyapeeth, Akola on 18th August 2021.
 - **Dr. Rajesh Kumar Pandey**, Assistant Professor, Department of Botany, Bundelkhand University, Jhansi, Uttar Pradesh became Zonal Coordinator of Microbiologists Society, India (MSI).
 - **Dr. Amar Bahadur**, Assistant Professor, Department of Plant Pathology, College of Agriculture, Tripura, Lembucherra, Agartala, has been awarded "Outstanding Faculty of The Year" in 9th Faculty Branding Awards 2021, organized by Education Expo TV (EET) CRS, Greater Noida, Uttar Pradesh, India at Kolkata.
 - **Dr. B.N. Mahto** working as Honorable Member, Provincial Policy and Planning Commission, Province No. 2, Janakpurdham, Nepal.
 - **Dr. Harikesh Bahadur Singh** has been conferred with Fellow of Royal Association for Science-led Socio-cultural Advancement (FRASSA), New Delhi.
 - **Dr. Krishna P. Singh** has joined as Joint Director Research, G.B. Pant University of Agriculture & Technology, Pantnagar on July 9, 2021.
 - **Dr. Mukund S. Kulkarni**, UHS, Bagalkot, Karnataka have been promoted as Director of Education at University of Horticultural Sciences, Bagalkot, Karnataka with effect from August 31, 2021.
 - **Dr. Naresh K. Mehta**, Former Associate Dean, Professor and Consultant Faculty, CCS Haryana Agricultural University, Hisar has been conferred with Dr. T.S. Thind Distinguished Plant Pathologist Award-2021 by Indian Society of Plant Pathologist (INSOPP), Ludhiana.
 - **Dr. Prasun K. Mukherjee**, Bhabha Atomic Research Centre, Mumbai has been elected as a Fellow of Indian National Science Academy (INSA). Dr. Mukherjee is also elected fellow of National Academy of Sciences, India (NASI) and National Academy of Agricultural Sciences (NAAS), and is a Fulbright Scholar.

Books Published

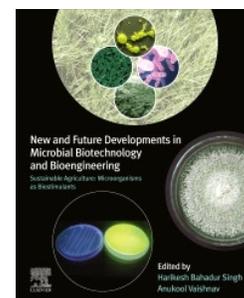
1. Fundamentals of Plant Pathology

Author: Sanjeev Kumar,
JNKVV, Jabalpur
Published by: New India
Publishing Agency (NIPA),
New Delhi
Published: 2021
Pages: 247
ISBN: 9789390591206



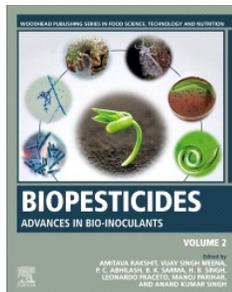
2. New and Future Developments in Microbial Biotechnology and Bioengineering: Sustainable Agriculture: Microorganisms as Biostimulants - 1st Edition

Editors: Harikesh Bahadur
Singh and Anukool Vaishnav
Published by: Elsevier,
Netherlands
Published: 2021
Pages: 392
Paperback ISBN: 9780323851633
eBook ISBN: 978032386000



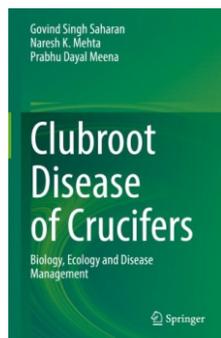
3. Biopesticides: Advances in Bio-inoculants Volume 2 - 1st Edition

Editors: Amitava Rakshit, Vijay Meena, P.C. Abhilash, B.K. Sarma, H.B. Singh, Leonardo Fraceto, Manoj Parihar and Anand Kumar
Published by: Elsevier, Netherlands, Woodhead Publishing Series in Food Science, Technology and Nutrition
Published: 2021
Pages: 430
Paperback ISBN: 9780128233559
eBook ISBN: 9780128236147



4. Clubroot Disease of Crucifers: Biology, Ecology and Disease Management

Editors: G.S. Saharan, Naresh K. Mehta and P.D. Meena
Published by: Springer, Nature, Singapore
Published: 2021
Pages: XXXIV, 757
Paperback ISBN: 978-981-16-2132-1
eBook ISBN: 978-981-16-2133-8



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Dr. Daliyamol (Mob.: 9481014573, Email: dml86@gmail.com)

Delhi Zone: December 15-16, 2021

Topic: Plant diseases: impact on potential for food security

Venue: Division of Plant Pathology, ICAR-IARI, New Delhi (Virtual mode)

Contact persons: Dr. Tusar Kanti Bag (Mob.: 7085951827, Email: tusar.bag@gmail.com)

Dr. Amrita Das (Mob.: 9821801595, Email: amritapatho@gmail.com)

Mid-Eastern Zone: February 21-22, 2022

Topic: Recent trends in plant pathology research to address emerging challenges for achieving food security

Venue: ICAR-Vivekananda Parvatiya Krishi Anusandhan Sansthan, Almora, Uttarakhand

Contact persons: Dr. Krishna Kant Mishra (Mob.: 9997887519, Email: mishrakkpatho@gmail.com)

Dr. H. Rajashekara (Mob.: 8791578163, Email: rajaiaripath@gmail.com)

Eastern Zone: March 6-7, 2022

Topic: Role of Plant Pathology in Global Environment and Food Security

Venue: Farmers Academy & Convention Centre (FACC), BCKV, Kalyani

Contact persons: Dr. Jayanta Tarafdar (Mob.: 9830342320, Email: jayanta94bckv@gmail.com)

Dr. Goutam Mondal (Mob.: 9433391247, Email: gmbckv@gmail.com)

Northern Zone: March 10, 2022

Topic: Crop Protection through Bio-rational Approaches - Current Trends and Future Perspective

Venue: CCSHAU, Hisar, Haryana

Contact persons: Dr. Kushal Raj (Mob.: 8295141777, 9416263020, Email: kushalraj@hau.ac.in)

Dr. Rakesh Chugh (Mob.: 9466728844, 7015577901, Email: drakeshchugh@hau.ac.in)

North-Eastern Zone: March 10-11, 2022

Topic: Current Trends in Plant Disease Management for Sustainable Crop Production and Livelihood Security

Venue: School of Crop Protection, CPGSAS, CAU, Umiam, Meghalaya

IPS Activities

IPS Zonal Symposium 2021-22

Western Zone: November 17-18, 2021

Topic: Achieving Suitability in Crop Production Through Alimentation and Plant Protection

Venue: College of Agriculture, Latur, Maharashtra

Contact persons: Dr. A.P. Suryawanshi (Mob.: 8007432634, Email: apsmkv@rediffmail.com)

Dr. C.V. Ambadkar (Mob.: 9420713356, Email: cv_ambadkar@rediffmail.com)

Southern Zone: December 1-3, 2021

Topic: Sustainable Plant Health Management Amidst Covid Pandemic: Challenges and Strategies

Venue: ICAR-Central Plantation Crops Research Institute, Kasaragod, Kerala (Virtual mode)

Contact persons: Dr. R.K. Tombisana Devi (Mob.: 9862282383, Email: totonene2011@gmail.com)
Dr. Pranab Dutta (Mob.: 9678906650, Email: pranabdutta74@gmail.com)

Central Zone: March 24, 2022

Topic: Special Satellite Symposium: Ameliorate Resilience of Arid Crops

Venue: SKN Agriculture University, Jobner-Jaipur, Rajasthan

Contact persons: Dr. Ritu Mawar (Mob.: 9664157098, Email: ritumawar1976@gmail.com)

Dr. Dama Ram (Mob.: 9109759182, Email: damaram.choudhary@gmail.com)

Announcement of IPS Award Applications 2021) and IPS Election Schedule (2022)

The online award application portal for the various awards of the Society is open from November 22, 2021 (<https://ipsdis.org/awards>). The last date for submission of the online application is December 22, 2021. Interested members are requested to apply for an award of their choice. Please go through the instructions available on the website before the online application (<https://ipsdis.org/award-guidelines>).

Election Schedule (2022)

The online nominations is invited from members of the Society having voting right for the following office bearers in the Executive Council of the Society as mentioned below.

- President Elect (2022)
- Zonal President (2022)
- Zonal Councillor (2022)

The Online Election Schedule

Start date of Preliminary nomination:	Dec 01, 2021
Last date of Preliminary nomination:	Jan 15, 2022
Counting of Preliminary nomination:	Jan 17, 2022
Dispatch of letter to nominees for consent:	Jan 19, 2022
Last date for receipt of consent/ withdrawal of nomination:	Jan 31, 2022
Start date of voting:	Feb 01, 2022
Last date of voting:	Mar 20, 2022
Counting of Final Votes:	Mar 21, 2022
Declaration of result:	In the Annual General Body meeting

DECLARATION OF RESULTS OF IPS AWARD 2021

The following names has been recommended for various awards of the Society.

1. **A.P. Misra Life time Achievement Award:** Dr. D.V. Singh, Head (Retd., Plant Pathology), C-14 D, MIG Flats, Vatika Apartments, Mayapuri, New Delhi
2. **S.P. Raychaudhuri Award:** Dr. T. Mohapatra, Secretary (DARE) & Director General (ICAR), Krishi Bhavan, New Delhi
3. **IPS Recognition Award**
 - (i) Dr. K.D. Srivastava, Professor and Head (Retd., Plant Pathology), House No. 23, Block-7 Sector 31, Spring Field Colony, Faridabad, Haryana
 - (ii) Dr. S. Gangopadhyay, Former Dean PGS, Professor and Head, C - 336, Karni Nagar Lalgarh, Bikaner Rajasthan
 - (iii) Dr. P. Bahadur, Professor (Retd.), D6/1003, Tulip Petals, Main Pataudi Road, Near Garhi Harsaru Sector-89, Gurugram Haryana
 - (iv) Dr. A.S. Indulkar, Executive Director, FMC-Cheminova India Ltd., The Centrium, Phoenix Market City Unit No. 2, Mumbai Maharashtra
4. **Sharda Lele Memorial Award:** Dr. Malathi P., Principal Scientist (Plant Pathology), Division of Crop Protection, Sugarcane Breeding Institute, Coimbatore, Tamil Nadu
5. **Mundkur Memorial Award:** Dr. Rashmi Aggarwal, Dean & Joint Director (Education) & Head (Plant Pathology), ICAR-Indian Agricultural Research Institute, New Delhi
6. **K.C. Mehta and Manoranjan Mitra Award:** Dr. Neena Mitter, Director, Centre for Horticultural Science, Queensland Alliance for Agriculture and Food Innovation, The University of Queensland, Brisbane Qld, Australia
7. **J.F. Dastur Memorial Award:** Dr. Sudisha Jogaiah, Assistant Professor and Programme Co-ordinator, PG Department of Biotechnology and Microbiology, Karnatak University, Dharwad, Karnataka
8. **A.K. Sarbhoy Memorial Award:** Dr. R. Thangavelu, Principal Scientist, Department of Plant Pathology, ICAR-National Research Centre for Banana, Tiruchirappalli, Tamil Nadu
9. **B.N. Chakraborty and Usha Chakraborty IPS Best Teacher Award:** Dr. S. Umesha, Professor, Department of Studies in Biotechnology, University of Mysore, Mansangotri, Mysuru, Karnataka

10. **M.K. Patel Memorial Young Scientist Award:** Dr. Susheel Kr. Sharma, Scientist (Plant Pathology), ICAR Research Complex for NEH Region, Manipur Centre, Lamphelpat, Imphal, Manipur
11. **Fellow of Indian Phytopathological Society (FPSI)**
- Dr. Bishnu M. Bashyal, Senior Scientist, Division of Plant Pathology, ICAR-Indian Agricultural Research Institute, New Delhi
 - Dr. J. Jayaraj, Professor of Biotechnology and Plant Microbiology, Dept. of Life Sciences, FST, The University of the West Indies, St. Augustine, Trinidad and Tobago
 - Dr. R.D. Prasad, Principal Scientist (Plant Pathology), ICAR-Indian Institute of Oilseeds Research, Rajendranagar, Hyderabad, Telangana
 - Dr. R. Ramesh, Principal Scientist, ICAR Central Coastal Agricultural Research Institute, Old Goa, Goa
 - Dr. Shaik Ameer Basha, Associate Professor, Department of Plant Pathology, College of Agriculture, Professor Jayashankar Telangana State Agricultural University, Rajendranagar, Hyderabad, Telangana
 - Dr. Narendra Singh, Associate Professor, AINP on Arid Legumes, Agricultural Research Station, Swami Keshwanand Rajasthan Agricultural University, Bikaner, Rajasthan
 - Dr. M.R. Khan, Professor, Dean, Department of Plant Protection, Faculty of Agricultural Sciences, Aligarh Muslim University, Aligarh, Uttar Pradesh
 - Dr. Dharmendra Kumar, Professor, Department of Plant Pathology, Banda University of Agriculture and Technology, Banda, Uttar Pradesh
 - Dr. Gireesh Chand, Professor, College of Agriculture, Central Agricultural University (I), Pasighat, East Siang, Arunachal Pradesh
 - Dr. Chinmay Biswas, Principal Scientist, Crop Protection Division, ICAR-Central Research Institute for Jute and Allied Fibers, Nilganj, Barrackpore, Kolkata, West Bengal
 - Dr. Pramod Kumar Gupta, Scientist (Plant Pathology), Technical Officer O/o Directorate of Extension Services, Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur, Madhya Pradesh

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