

ADAPTING TO NEW NORMAL: SOME REFLECTIONS ON ROLE OF EXTENSION IN THE CONTEXT OF COVID-19



India's extension systems, with cross-country presence and grass root level outreach, has multiple roles to play in supporting the farming community in their struggle against the pandemic COVID-19 and its ill effects on

agricultural sector. Shantanu Rakshit, Reshma Gills, Anshida Beevi, C. N. Sajesh V. K. and Ph. Romen Sharma discuss some of the potential roles of extension in enabling the farming community to adapt to a new normal.

CONTEXT

COVID-19 has affected all walks of life including agriculture. The scenario points to the possible dip in production and supply of agricultural commodities due to many factors like disruption in supply chain of inputs and outputs, reverse migration of migrant labourers, price fluctuation, etc. The general inelasticity of the food demand has had a limited effect on the overall food consumption pattern, though there is a leeway of a disproportionately larger dependency on the grains and vegetables rather than animal protein-based food products. Agriculture and allied sectors help us meet necessities, prevent famishment and support livelihoods. Hence, they need to be functional in these challenging times.



Agricultural extension, being the broadened arm to loop farmers with the research system and governance, has major role in empowering farmers in this difficult situation. This in turn requires a complete overhaul of the system from its conventional approaches to a 'new extensionist' perspective. The present scenario demands strong institutional support to agriculture and behavioural changes in not only hygiene, but also in the adoption of sustainable ways of living to thrive in the situation. Since the extension system helps with voluntary behavioural change among the

communities it works with, effective communication is now more important than ever. Similarly, extension agencies in public, private and civil society need to take up a range of activities like disaster management, attracting and retaining youth in agriculture to prevent distress migration, leveraging the potential of collectives, value chain development and integrating ICTs across the value chain in more dynamic and innovative ways.

RISK COMMUNICATION AND DISASTER MANAGEMENT

During recent times, initiatives related to climate change and disaster management, adaptation and mitigation, were most discussed and implemented in agriculture. But, most of the climate change related efforts are focused on technological push rather than holistic disaster management approaches. For a more realistic impact, institutional innovations, coupled with knowledge integration and community mobilization, are more important than technological inputs. Facing challenges put forth by a pandemic is a herculean task for technology-led climate adaptive systems. The present situation, firstly, demands strengthening risk management abilities of extension system to enable farmers and rural producers face disasters of any sort. More efforts are required in this direction.

Developing the risk management capacity of extension personnel is the larger issue. EDEN (Extension Disaster Education Network) in the USA is an example. EDEN is a collaborative multi-state effort by extension services across the USA to reduce impact of disasters through research-based education. In addition to strengthening the capacity of extension personnel, the mission of EDEN involves enhancing disaster preparedness of communities and other stakeholders as well as serving as national source for research based disaster education. The cooperative extension service in the USA has community development, home economics and 4-H youth development as mandated areas in addition to agriculture. It necessitates community level interventions of extension systems. Agricultural extension system in India are mandated to work in agriculture and allied sectors, but can partner with broad range of actors to reduce vulnerability of farmers and fishers.

Disaster management is a collective effort of many actors like local institutions, farmer collectives, media and civil society organizations, in addition to government agencies in public health, civil supplies and public administration. The extension system strengthened with adaptive risk management strategies has to work closely with these agencies in the interest of farming community for widespread dissemination of preventive and mitigating measures to minimize farming losses. The Indian Council of Agricultural Research (ICAR) has dispensed state-wise guidelines for farmers/fishermen while harvesting, post-harvest operations, storage and marketing of farm/fish produce during lockdown. The advisories were popularised with different electronic and print media including social media like WhatsApp, Facebook and twitter.

1. <https://icar.org.in/sites/default/files/eBook-COVID-19-ICAR-Initiatives.pdf>
2. <https://icar.org.in/sites/default/files/Kharif%20agro-advisory%20for%20farmers.pdf>
3. file:///C:/Users/HP/Downloads/HOMEMADE%20FEED_CIBA.pdf
4. <file:///C:/Users/HP/Downloads/State%20level%20advisories%20FINAL%20submitted%20word%20file%20for%20publication%202nd%20April2020.pdf>
5. <https://icar.org.in/content/cift-covid-19-advisory-fishermen>
6. <http://ivri.nic.in/circulars/advisory27042020.pdf>

Similarly, in the time of pandemic, the presence of extension and communication system need to be amplified to manage associated social stigma, if any. Being the most influential and credible information source for the rural farming community, extension agents have the social responsibility to communicate facts and figures, to correct misconceptions and misinformation which may contribute to social stigma and discrimination at community level.

Farmers in rural areas are vulnerable with less competitive and inefficient marketing systems and need facilitation in marketing of crop produce. This is another area where extension needs to build capabilities and developmental strategies. In the following sessions, we have discussed some of the marketing innovations and models emerged *in-situ* during the lockdown period. Capacity enabled extension systems could take valid lessons from these initiatives and develop many adaptive and efficient models to navigate risks and uncertainties that may arise in agriculture marketing.

INFORMATION AND COMMUNICATION TECHNOLOGIES (ICTs) AND BEYOND

Farming community requires real-time information and advisories to address issues and problems. Amid lockdown, farmers were restricted from visiting formal institutional sources to get required support. Similarly, the movement and field visit of extension personnel, who play a key role in technology transfer and information dissemination, was also limited. In this context, going digital by exploring options (mobile phones, interactive video calls, television, community radio, digital marketing platforms, social media, etc.) of ICTs was considered the best way to connect with distantly located farmers and other actors. It is quite appreciable that many state and central extension agencies are increasingly involved in electronic mode of information dissemination. The Sikkim government has circulated district specific helpline numbers to support farmers during lockdown (Sikkim Chronicle, 8 April 2020). Private ventures like Aquaconnect have launched an emergency helpline to support Indian shrimp and fish farmers during the lockdown (BW Business World, 4 May 2020). Different educational and training institutions are also utilizing online platforms for providing advisory support to farmers.

The Haritha Keralam Mission of Kerala has utilised Facebook live for classes on vegetable farming to encourage an increasing number of people into farming. Kerala Agricultural University released online videos on vegetable cultivation in kitchen gardens along with round-the-clock helplines being operated through KVKs and research stations in all districts. Platforms like Meghdoot app developed by IMD and ICAR will be effective for transfer of advisories with its localized weather and agro-advisories services.

The Alumni Association of University of Agricultural Sciences, Bangalore, has started an initiative to help grape farmers to find markets by connecting them with Resident Welfare Associations / Bulk Consumers through WhatsApp. They have also developed a Google form for associations and consumers to express their requirement of different fruit and vegetables that will be delivered to their doorstep without physical contact.

The Union Ministry in April launched the *KisanRath* mobile app to facilitate farmers and traders in searching for transport vehicles for movement of agriculture & horticulture produce (PIB, 17 April 2020). The Punjab Mandi Board (PMB) introduced ePMB, an e-Pass system. This system automatically generates appropriate number of passes based on historical data available with the Mandi Board. The passes for a given day are issued to the *Arthiyas* (commission agents) three days prior to avoid any kind of rush. This automated solution eliminates all unnecessary biases and favouritism, thereby bringing transparency to the process (Express Computer, 21 April 2020).

There are many ICT based initiatives as mentioned above, but the issue of digital divide may limit the reach to such initiatives by the farming community. The rural internet density was reported to be 27.57 i.e. number of internet subscribers per 100 people (TRAI, 2020). Connectivity and speed are other binding issues. Extension has to promote ICT use among farmers and improve their readiness to use technology. But at the same time, human intermediation should be made possible in areas where, access to ICTs is constrained. Farmers' organisation can play an intermediary role and facilitate access to ICTs for the unreachable.

Several novel initiatives have been taken in response to the emerging situation. But, few systematic studies have been conducted on the impact of ICT based initiatives. Information on the number of beneficiaries, their level of satisfaction, challenges they face in accessing these services, the way to improve effectiveness of these initiatives, etc. should be examined before replicating these initiatives on a larger scale.



LEVERAGING THE POTENTIAL OF COLLECTIVES AND TRANSFORMATIVE SUPPLY CHAIN

Recently, collectives of various size and activities have emerged as major determinants of farmers' welfare in India. From neighbourhood groups to large producers companies, collectives are now revolutionising Indian agriculture. In addition to advantages like resource pooling, transaction cost reduction and increasing bargaining power of farmers, collectives have the potential to act as the point of convergence for various schemes and developmental agencies.

Farmer Producer Organisations (FPOs) are playing important roles in sustaining the supply chain of grains, fruits and vegetables while exploring direct marketing-based new supply chains. FPOs are continue to facilitate linkages between farmers, processors, traders and retailers to coordinate supply and demand. During lockdown, Small Farmers Agribusiness Consortium (SFAC) assisted FPOs by collating data on surplus produce available with FPOs and helping them establish direct market linkages with buyers. More than 1000 FPOs are now aboard the eNAM platform facilitated by SFAC. The eNAM introduced 'FPO trading module' to strengthen agriculture commodity supply chain and to decongest the mandis. The FPOs can trade their produce from their collection centres without bringing the produce to the mandi through this module.

Disruptions in the supply chain of perishables – vegetable and fruits – were other major issues. Due to lockdown and non-compliance with social distancing norms, several APMC markets are either closed or partially functioning. Farmers could not send their produce to the market owing to transport problems. Farmers are not getting adequate price for their produce. Urban consumers are also

experiencing shortage and high price of vegetables and fruits. In the present context, it is necessary to find out new supply chain for vegetables and fruits, which will benefit both farmers and consumers. AESA Covid19-field note-9 has detailed the alternate supply chain developed for mango farmers in Muthalamada Kerala by HORTICORP, an agency under department of agriculture and farmers welfare, Government of Kerala. Mangoes were procured directly from farmers through clusters under the supervision of agricultural officers. These were further transported to HORTICORP outlets and local markets (Sujith and Mary Vijaya, 2020).

Direct marketing needs to be promoted. While discussing strategies to tackle COVID-19 with Chief Ministers in April, the Prime Minister of India, Narendra Modi, suggested states to incentivise farmers for direct marketing of farm produce to buyers' doorsteps, which would prevent crowding in 'mandis' and urged all states to reforms regulations in this line (The Times of India, 11 April 2020).

The vegetable Growers Association of India (VGAI) started connecting farmers with housing societies of Pune and Mumbai (Sakal Times, 30 April 2020). The farmers of Parbhani and Aurangabad in Maharashtra formed a chain to collect vegetables from fields and take it to housing societies. In many places, the district administration is facilitating linkages between farmers' groups and housing societies. This arrangement is a win-win situation for both cultivators and consumers. Farmers are getting better prices without losing to middlemen and wholesale dealers, while consumers are getting fresh produce at their doorstep at affordable better prices. (Business Line, 30 March 2020).

The marine fisheries sector in Kerala has undertaken a very innovative supply chain modification right from the harbour during lockdown. Fishermen have been allowed to sell their catch without going for open auction, as was the practise earlier in the harbour. However, the price of fish is decided by Harbour Management Societies headed by respective District Collectors. These societies ensure minimum fair price for primary producers based on quality. The Fisheries Department of Kerala has developed an IT application to enable hassle-free selling of fish through booking in advance. To promote social distancing, vehicles are allowed entry to the harbour for purchase of fish on the basis of their booking. For those engaged in small business, market points are worked out and *Matsyafed* (the Kerala State Co-operative Federation for Fisheries Development Ltd.) ensured fish availability at these points in quantities booked in advance. Work hours were also introduced in fish markets i.e. they function from 7 am to 11 am only (Business Line, 3 April 2020).

The Association of Agricultural Officers Kerala and the Kerala Pineapple Farmers' Association have joined hands to launch a 'pineapple challenge' to address the issue of large quantities of unsold harvest in the wake of COVID-19 spread (Kanatt and Jos, 2020). Around 1,200 tonnes of pineapple reach the Vazhakkulam main market, near Muvattupuzha, every day. Considering the non-availability of drivers for transporting fruits to major markets, farmers and farm officials decided to deliver 'A' grade pineapple based on a minimum order of 100kg at a price of ₹ 20 per kg. This assured an attractive price, given the current market rate, and helped farmers. Farm officials have appealed to traders, voluntary bodies and residents' associations to place orders with a condition that the minimum order should be for 100kg (AESA COVID19 Field note-4)). The pineapples were also sold through outlets opened by Kerala State Horticultural Products Development Corporation (Horticorp) and the Vegetable and Fruit Promotion Council, Keralam.

Extension systems should help farmers/ farmers' collectives to explore new supply chains, connect with buyers and develop sustainable direct marketing models. As most farmers are unorganised and not tech-savvy, organizing them into FPOs ICTs. FPOs can help in supporting the livelihood of farmers by ensuring the functioning of supply chain, as in the case of Mahagrapes (Kumar and Sharma, 2016). Livestock sector is likely to be constrained by unavailability of feed, poultry chicks, fish seeds, etc.

FPOs, co-operatives and private stakeholders should coordinate with line departments for smooth movement and delivery of inputs.

ADDRESSING CHALLENGES OF REVERSE MIGRATION

Migrants who returned to their hometowns are likely to find difficult to engage in meaningful employment. It will in turn affect their household expenditure and food security. Migration may lead to labour shortage for agriculture activities in labour intensive crops like paddy. Promotion of community resource centres like custom hiring centre and cooperatives can help in coping with labour shortage.

Extension agencies like KVK can play a major role in skilling (re-skilling or up skilling) reverse migrant workforce for farm and non-farm rural employment opportunities based on local needs and labour market demands. Potential of agro processing needs to be explored for employment and income generation. ICAR has already instructed all KVKs to plan economic activities along with skill-based trainings for the migrant workforce. KVKs have shared their opinion about strategies for migrant labourers during this Covid-19. KVK-Kotwa organised a training programme on beekeeping for migrant workers for three days under the new government initiative, Prime Minister's Garib Kalyan Rojgar Abhiyan. About 35 migrant labours were trained and reskilled in scientific beekeeping and honey processing practices (Live Hindustan, 09 Jul 2020). KVKs in different districts can stand as custodian for re-skilled and up-skilled workforce if they map and keep a repository of the workforce. It will help farmers, entrepreneurs or potential job providers to get certified skilled workers from KVKs when they need skilled hands for their farm and related operations. Distress returned migrated labour can be accommodated in rural employment generation programmes like MGNREGA. The office of the principal scientific advisor (PSA) to the Indian government has come up with a 'Covid-19 agriculture track to support migrant workers with technologies and information for profitable farming'. It also proposed to train youngsters among migrant workers as change agents to facilitate technology dissemination in villages (Economic Times, 11 June 2020).

In the recent year, Agriculture Skill Council of India (ASCI) under the aegis of Ministry of Skill Development & Entrepreneurship has been working towards skill upgradation of farmers and wage workers in agriculture and allied sectors. ASCI developed 169 qualification packs for imparting training through 900 training partners. These facilities can also be utilised to upgrade skillsets of returned migrant workers for locally available employment avenues.

PROMOTION OF LOCALISED EXTENSION STRATEGIES

Extension system has the onus of emphasizing local production and consumption. It requires local extension strategy, starting with developing database of all agencies involved in technology dissemination and implementation of development programmes. Kumar (2018) in AESA blog 86 discussed the importance of having an extension census to identify the major actors in the extension and advisory landscape. It was noted that huge extension resource base is available, but belongs to diverse organisations and sectors. Synergising the efforts of these actors for the welfare of the farming community is the need of the hour. In addition, database of resources, farmers, labour availability, technologies and markets should be developed through a 'best fit approach for the locality'. The localised strategies must give prime importance to family farming/ home grown food production for sustainability of livelihoods. In this regard, cultivation of many unexploited, neglected and underutilised nutritious food crop varieties, vegetables and fruits need to be promoted through specialised advisories and quality input kit supply on demand basis.

The farming community needs to be strengthened and capacitated to develop localised markets and direct value chains to overcome unforeseen price fluctuations and disruptions in the market structure due to pandemics or destructive conditions. Dependence on informal credit sources may rise. Institutional arrangement for credit may be arranged for distressed households and agricultural activities. Grass root capacity building in a gender-neutral manner is needed to realize opportunities on-farm and off-farm activities. This may enable them to see farming as a business enterprise and prefer agriculture as a viable livelihood option. The issue has already gained policy attention. Agriculture Technology Management Agency (ATMA) stresses identifying local research and extension priorities in consultation with farmers during the preparation of the Strategic Research and Extension Plan (SREP). Other features of ATMA like mobilization of farmers' groups as well as promotion of agri-entrepreneurs, custom hire service providers and input dealers are intended to supplement the efforts of public extension functionaries (DAC 2014). The concept of farmers' friend is another key feature in ATMA to strengthen the linkage between agricultural extension system and farmers in the village.

Such localised and need specific extension efforts must also have a strategic dimension to handle the social stigma associated with the pandemic by facilitating social relationship rebuilding among the rural people and communities. It can be achieved through collaboration, coordination and convergence of different departments like health, agriculture, mental health and disaster management to explain various issues and its measures devised at local level. The stress and anxiety caused by the pandemic among rural people and farmers will have very adverse effects on existing structure of the society. Counselling and timely advice to distressed people is very essential to maintain strong social relationships and interconnectedness. Involvement of Panchayati Raj Institution (PRIs) will be the key determinants in the formulation and implementation of such localised strategies. They can converge the strength of various agencies and schemes and customise it to the local needs and priorities. Also, PRIs can facilitate involvement of local organizations and key stakeholders in the implementation of localised extension strategies. Extension agents, who are the change agents, can mobilize farmers and rural people to synergise and garner the effect of convergence efforts.

WAY FORWARD

Extension systems have to innovate potential methods for adapting to the new normal. In this article, we tried to highlight some of the aspects and related initiatives which merit the attention of extension system. Compartmentalised discussions or initiatives may not be sufficient to create strategic change in extension methods and its specific applications. Harmonious blending of research outputs and its implications on outcomes can to be ensured through convergence of experimental outputs, policy suggestions and insight on field implications and extension efforts of NARS, DoE-DAC, private extension agencies, community level organizations, etc. Assimilating the learning from field cases with the experience of professionals can add to developing appropriate extension strategies.

References

Business Line (3 April 2020). Kerala partially eases fishing curbs, allows country crafts to venture into sea. <https://www.thehindubusinessline.com/news/national/kerala-partially-eases-fishing-curbs/article31248297.ece>

Business Line (30 March 2020). How Maharashtra farmers are earning through direct selling amid Covid-19 lockdown. <https://www.thehindubusinessline.com/economy/agri-business/how-maharashtra-farmers-are-earning-thru-direct-selling-amid-covid-19-lockdown/article31209005.ece>

BW Business world (4 May 2020). Aquaconnect Launches Helpline Number to Support Shrimp Farmers during COVID 19 Lockdown. <http://www.businessworld.in/article/Aquaconnect-Launches-Helpline-Number-To-Support-Shrimp-Farmers-During-COVID-19-Lockdown/27-03-2020-187472/>

Deccan Chronicle (18 April 2020). Bengaluru grape farmers go direct to consumers, and movement spreads like wild fire. <https://www.deccanchronicle.com/nation/in-other-news/180420/bengaluru-grape-farmers-go-direct-to-consumers-and-movement-spreads-l.html>

Deccan Herald (28 March 2020). COVID-19: Kerala starts delivering free food at doorsteps by setting up community kitchens. <https://www.deccanherald.com/national/south/covid-19-kerala-starts-delivering-free-food-at-doorsteps-by-setting-up-community-kitchens-818421.html>

Economic Times (11 June 2020). Covid-19 agri track to help migrant workers. <https://economictimes.indiatimes.com/news/politics-and-nation/covid-19-agri-track-to-help-migrant-workers/articleshow/76309334.cms>

e-NAM Website. https://enam.gov.in/web/all_news_desc

ETGovernment (2 May 2020). Central Road Research Institute launches 'Kisan Sabha' app. <https://government.economictimes.indiatimes.com/news/digital-india/central-road-research-institute-launches-kisan-sabha-app/75506020>

Express Computer (21 April 2020). COVID-19 lockdown: Punjab's ePMB app to schedule mandi arrivals. <https://www.expresscomputer.in/news/covid-19-lockdown-exit-punjab-cova-app-to-schedule-mandi-arrivals/52968/>

ICAR-ATARI, Pune, (29 April, 2020). ICAR-Agricultural Technology Application Research Institute, Pune, Maharashtra. <https://icar.org.in/content/online-orientation-training-farmers>

India Today (5 May 2020). Technology comes to rescue of UP farmers during coronavirus lockdown. <https://www.indiatoday.in/india/story/farmers-up-coronavirus-lockdown-technology-1674525-2020-05-05>

India TV News (4 April 2020). Mizoram launches COVID-19 app, farmers helpline. <https://www.indiatvnews.com/news/india/mizoram-launches-covid-19-app-farmers-helpline-604344>

Kanatt, P. T. and Jos, J. (2020). Crisis Management through agile Intervention – Helping Pineapple Growers in Kerala Agricultural Extension in South Asia- Field Notes 4, <https://www.aesanetwork.org/field-notes-4-crisis-management-through-agile-intervention-helping-pineapple-growers-in-kerala/>

Kumar, S. (2018). Extension Census - The Prerequisite for Strengthening Extension. AESA blog 86. Agricultural Extension in South Asia (AESA). <https://www.aesanetwork.org/wp-content/uploads/2018/06/AESA-BLOG-86.pdf>

Kumar, S., & Sharma, A. (2016). Agricultural value chains in India: prospects and challenges. Discussion paper, *CUTS International, Jaipur*.

Live Hindustan (2020). कृषिविज्ञानकेंद्रनेप्रवासीश्रमिकोंकोदीर्घनेत्रिंग. <https://www.livehindustan.com/uttar-pradesh/azamgarh/story-krishi-vigyan-kendra-gave-training-to-migrant-workers-3339085.html>

Manorama Online (10 April 2020). <https://english.manoramaonline.com/news/kerala/2020/04/10/coronavirus-covid19-kerala-lockdown-news-you-can-use-helpline.html>

PIB (15 April 2020). Press Information Bureau. Government of India. 15-April-2020. <https://pib.gov.in/newsite/PrintRelease.aspx?relid=202266>

PIB (17 April 2020). Press Information Bureau. Government of India. 17-April-2020. <https://pib.gov.in/PressReleasePage.aspx?PRID=1615352>

Sakal Times (30 April 2020). Farmers, consumers both happy with the new system. <https://www.sakaltimes.com/coronavirus-pune-nation-maharashtra/farmers-consumers-both-happy-new-system-49294>

Sikkim Chronicle (8 April 2020). Helpline setup for local farmers' assistance during lockdown. <https://www.thesikkimchronicle.com/helpline-setup-for-local-farmers-assistance-during-lockdown/>

Sujith S. S and Mary Vijaya (2020). Government Interventions in supporting Mango Farmers in Kerala during COVID-19, Agricultural Extension in South Asia- Field Notes 9, <https://www.aesanetwork.org/field-notes-9-government-interventions-in-supporting-mango-farmers-in-kerala-during-covid-19/>

The Hindu (1 April 2020). HortiCorp steps in to address shortage of vegetables, fruits. <https://www.thehindu.com/news/national/kerala/hortcorp-steps-in-to-address-shortage-of-vegetables-fruits/article31222103.ece>

The Hindu (30 March 2020). VFPC launches online fruit sales in capital. <https://www.thehindu.com/news/cities/Thiruvananthapuram/vfpck-launches-online-fruit-sales-in-capital/article31212080.ece>

The New Indian Express (3 May 2020). App helps farmers connect with consumers during extended COVID-19 lockdown. <https://www.newindianexpress.com/thesundaystandard/2020/may/03/app-helps-farmers-connect-with-consumers-during-extended-covid-19-lockdown-2138381.html>

The Times of India (11 April 2020). Farm to fork: PM urges states to incentivise direct marketing to decongest mandis during lockdown period. <https://timesofindia.indiatimes.com/india/farm-to-fork-pm-urges-states-to-incentivise-direct-marketing-to-decongest-mandis-during-lockdown-period/articleshow/75100271.cms>

TRAI (2020). The Indian Telecom Services Performance Indicators July – September, 2019. https://traigov.in/sites/default/files/PIR_08012020_0.pdf

UASB Alumni Association Website. <http://www.alumniuasb.in/>

Shantanu Rakshit, Scientist, ICAR-National Research Centre on Camel, Bikaner, Rajasthan. (Email: rakshitshantanu90@gmail.com)

Reshma Gills, Scientist, ICAR-Central Marine Fisheries Research Institute, Ernakulam, Kochi, Kerala. (Email: reshma1818@gmail.com)

Anshida Beevi C. N., Scientist, ICAR-Central Research Institute for Dryland Agriculture, Hyderabad, Telangana. (Email: anshidashref@gmail.com)

Sajesh V. K., Scientist, ICAR-Central Institute of Fisheries Technology, Cochin, Kerala. (Email: sajeshvk@gmail.com)

Ph. Romen Sharma, Scientist, ICAR Research Complex for NEH Region, Nagaland Centre, Medziphema, Nagaland. (Email: romen.agext@gmail.com)

**AESA Secretariat: Centre for Research on Innovation and Science Policy (CRISP),
Road No 10, Banjara Hills, Hyderabad 500034, India
www.aesanetwork.org Email: aesanetwork@gmail.com**