



# Enabling agricultural innovation systems to promote appropriate technologies and practices for farmers, rural youth and women during COVID-19

## OVERVIEW

The ongoing COVID-19 pandemic is endangering the health and livelihoods of millions of people. Physical distancing and lockdown measures are becoming the new normal and creating pressures on employment and work in rural areas. This situation is causing disruption to agri-food supply chains, from production to access to markets. Furthermore, the pandemic is expected to cause deep socio-economic crisis in the long term, since many countries are already struggling to recover from the crisis in the near future.

The impact of the COVID-19 pandemic will vary for different groups of rural population, with the highest impact expected to be on farmers and other vulnerable groups, especially women and youth. Three courses of action are therefore essential:

- monitoring how different groups are being affected and provide targeted support;
- facilitating access to inputs, services and markets, and income generating opportunities in the short and long term; and
- empowering the most vulnerable to find solutions to location-specific problems.

Targeted support is feasible only by activating a network of actors or organizations within agricultural innovation systems (AIS) and promoting customized technologies and practices suitable for location specific contexts. AIS actors include experts engaged in agricultural education, research (public and private), business enterprises (agricultural value chain actors, agricultural marketing committees, regulated markets, input suppliers, procurement arrangements), formal and informal bridging institutions (public extension and advisory services, farmers organizations, private extension agents, commodity groups etc.,) and enabling the environment (government policies and programmes to respond to COVID-19 pandemic).

AIS actors can readily access technologies and practices from existing knowledge portals, guidelines and manuals available at national and/or global levels and quickly adapt to local contexts to improve the effectiveness of their response. FAO provides an extensive repository of good practices and technologies as part of its online knowledge portals. These can be easily adopted to respond to the needs of the smallholders, rural youth and women affected by lockdown due to the COVID-19 pandemic, improve their food security and create income-generating opportunities. These practices and technologies have been applied and tested on the ground and packaged for the benefit of various AIS actors.

### KEY MESSAGES

---

- The COVID-19 pandemic and lockdown measures, as well as the expected subsequent socio-economic crisis are likely to have varied impacts on different population groups. The vulnerabilities of farmers, small-scale producers, rural women and youth are likely to be aggravated due to prolonged restriction of movement, and the subsequent lack of employment and income-generation opportunities.
- A network of actors or organizations within agricultural innovation systems (AIS) should be engaged to provide needs-based support to the affected populations. The range of AIS actors includes agricultural schools, research institutions, business enterprises, agricultural value chain actors, and input suppliers, as well as formal and informal bridging institutions that are facilitated by government policies and programmes to respond to COVID-19 pandemic.
- The technologies and practices already tested on the ground, existing guidelines and resource materials need to be customized to the local context. FAO's online knowledge portal such as technologies and practices for small agricultural producers (TECA) and TAPipedia provide information and guidelines on a wide range of existing technologies and practices that can be easily adopted to improve food security and income.
- Vulnerable rural populations, especially farmers, women and youth, are constantly innovating in their battle to cope with crisis situations. The AIS actors should take advantage of such local innovations and facilitate their implementation through capacity building and engagement of relevant AIS actors by following country-specific restrictions related to COVID-19 pandemic.

### COVID-19 AND FARMERS, SMALL-SCALE PRODUCERS, RURAL YOUTH AND WOMEN

---

Small-scale farmers, rural women and youth face many challenges during the COVID-19 pandemic as their livelihoods depend on both on-farm and off-farm employment. They already suffer from unemployment and precarious working arrangements, in addition to socio-cultural norms which make access to inputs, services and credit difficult.

The current crisis makes these challenges even more acute and, in consequence, renders women and youth extremely vulnerable to food insecurity, exclusion and even violence:

- Vulnerable rural populations such as landless agricultural labourers, women and youth often engage in occasional wage work, petty trade, migration and other, usually informal, activities which are hit hard by mobility restrictions and economic disruption. As a result, they lose income-generation opportunities and thus depend on relief measures.
- Due to the crisis, smallholders may face even more difficulties in accessing inputs, markets and other key services. With disrupted supply chains and mobility restrictions causing scarcity in inputs and services, only few producers may be able to access them through established connections and existing social capital.
- Women tend to be overburdened with household-level responsibilities which are likely to increase during the COVID-19 pandemic. They may thus be prevented from engaging in income-generating activities. Furthermore, during the crisis and especially during the lockdown, when women are confined to their homes, they are at a greater risk of domestic violence.

These are only a few of the complex and multi-dimensional challenges faced by small-scale producers, rural youth and women. The response to the wide range of problems facing various

vulnerable groups requires an agricultural innovation system perspective involving various actors. The technologies and practices proposed as part of response measures are also diverse. Fortunately, the many existing technologies and practices enable us to adapt very quickly and facilitate scaling up our response to improve food production and create income generation opportunities.

There is an urgent need to support small-scale producers, youth and women to adopt existing technologies and practices, but also to empower them to innovate and develop their own ideas and localized solutions. Hence the importance of focusing on capacity development to increase the inclusion and participation of relevant actors. Non-governmental organizations, extension and advisory service providers, civil society organizations, and local authorities must coordinate their efforts to promote innovative solutions which are viable during the pandemic.

Clearly, the confinement measures do not allow for regular training and extension services. However, the organizations promoting technologies and practices can use simple ICT solutions such as social media, SMS, radio and TV. The network of community-based organizations, farmer leaders and other actors on the ground can be successfully enlisted in supporting youth and women in their location without long-distance movement by respecting the restrictions. For more guidance on effective provision of extension and advisory services to rural population during and after the pandemic, see the FAO Policy brief on "[Extension and advisory services: at the frontline of the response to COVID-19 to ensure food security](#)" (FAO, 2020).

### **KEY AIS ACTORS AND THEIR ROLES IN STRENGTHENING THE RESPONSE TO COVID-19**

#### **Who are the key AIS actors?**

Innovation is spurred by dynamic networks of actors, with collaboration and learning fostered in various ways based on country and context specificities. AIS actors can contribute a great deal to the COVID-19 response if they are well coordinated at different levels, with a clear perception of their roles and responsibilities. The agricultural innovation system that can form part of a COVID-19 response includes different key actors who belong to three main spheres: 1. Agricultural Education and Research; 2. Bridging Institutions; and 3. Business and Enterprises (TAP, 2016)<sup>1</sup>.

1. The **Agricultural Education and Research** sphere include actors from education institutes at various levels (mainly, but not exclusively, tertiary and universities) and researchers from public, non-governmental and private sectors (including universities). It is crucial that teachers, researchers and lecturers are well connected to each other. A typical example of collaboration is those programmes designed to update educational material and to innovate curricula also through fostering cooperation.

2. The term "**Bridging Institutions**" refers to formal and informal actors who bridge relationships among groups and connect them to resources and services. This group includes actors from public and private extension and advisory services (EAS), producers' organizations (PO), other stakeholders' and commodity groups and agents for contract farming.

3. In the **Business and Enterprises** sphere, the key actors range from farmers to agribusiness dealers, such as input suppliers and processors. This group also includes agricultural marketing committees and relevant government and private-sector enterprises. As end users, consumers

---

<sup>1</sup> Agricultural Innovation Systems (AIS) – A new take on innovation. <http://www.fao.org/in-action/tropical-agriculture-platform/background/ais-a-new-take-on-innovation/en/>.

are also increasingly recognized as actors in the innovation processes, in light of their demand for sustainable and locally sourced food.

In addition to the above-mentioned actors, others also play a crucial role, contributing to an enabling environment which stimulates innovation. Policy makers and administrative bodies are the most obvious examples, but other informal actors and factors, such as science actors and technological advances, can also influence innovation processes.

### How can AIS actors provide support in the COVID-19 context?

Those individuals and organizations who traditionally support farmers, women and youth are best positioned to help respond to the COVID-19 pandemic. In particular, institutions can re-orient their syllabus and explore the impact of COVID-19 on agriculture and food security through their ongoing online classes. Education institutes might adopt digital approaches to raise awareness about COVID-19. Researchers can re-orient their work and make their laboratories available to test the population for COVID-19, making use of the many agricultural universities and research centres providing access to their laboratories to test for COVID-19.

Among bridging institutions, extension and advisory services can play a crucial role in assessing the situation in the field, given their presence in rural areas and their greater access to community leaders and farmers organizations (FAO, 2020)<sup>2</sup>. Producers' and other organizations such as commodity and community groups can advocate for local needs in policy arenas and create opportunities for the smallholders in terms of better access to markets, inputs and service provision. Being already present in the communities, these organizations can work closely with community leaders to provide services that would be not be accessed otherwise. Together with EAS actors, producer organizations and other organizations can raise awareness and ensure that essential information is disseminated to relevant actors in the value chain. They can also undertake less traditional actions such as the distribution of safety equipment.

Business and enterprises can help overcome market disruption, by regulating commodity prices, improving access to inputs and essential supplies, providing opportunities for cold storage of excess produce, and processing and value addition. They might introduce new digital tools and payment schemes.

Policy actors have an important role to play in several ways:

- formulation of policy responses;
- providing access to credit facilities with low interest rates, special loans and relaxation of terms of loan repayment;
- reallocating unused agricultural funds to fight the effects of COVID-19 crisis in rural areas;
- regulating border flows;
- allowing green lanes for circulation of vehicles transporting critical goods (agriculture, aquaculture and fisheries);
- developing specific guidelines for the AIS actors;
- implementing them to benefit smallholders, women and youth.

The table below illustrates more in greater detail the types of support for smallholders, women and youth that AIS actors can provide in response to the COVID-19 pandemic.

---

<sup>2</sup> For more information on the new role of EAS in the COVID-19 crisis, refer to the FAO brief: Extension and advisory services: at the frontline of the response to COVID-19 to ensure food security, FAO 2020 <http://www.fao.org/3/ca8710en/CA8710EN.pdf>.

For all the actions described two main criteria must be followed at all times:

- 1) Respect for interpersonal distance
- 2) Compliance with the country-specific regulations and movement restrictions

**Table 1 | Key AIS actors and the type of support in response to COVID-19**

Key AIS actors		Type of support
<b>Agricultural education</b>	Lower and higher education institutes, technical-professional centres	<ul style="list-style-type: none"> <li>• Create awareness of the impact of COVID-19 on agriculture and food security</li> <li>• Develop e-courses and create educational programmes on COVID-19 and its impact and response measures in agriculture to be implemented through for remote learning (internet, radio, etc.)</li> <li>• Include practical guidelines in the curriculum addressing the COVID-19 response in agriculture and also relevant technologies and good practices.</li> <li>• Provide access to the laboratories for COVID-19 testing by the health professionals.</li> </ul>
<b>Agricultural research</b>	Public/private/non-governmental agricultural research institutes, universities	<ul style="list-style-type: none"> <li>• Help adopt and make available technologies and practices for COVID-19 response.</li> <li>• Work closely with public health departments and authorized hospitals to increase COVID-19 testing capacity (e.g. making available laboratory equipment).</li> <li>• Collect data and modelling scenarios and conduct comprehensive research on the differentiated socio-economic and agricultural impacts of COVID-19 on food chain and rural communities, including youth and women.</li> <li>• Advise on mitigation strategies for agricultural policy makers and rural advisory services</li> <li>• Promote partnerships between private and public institutions, including EAS, to exchange information and learn from experience in other countries, document and scale-up good practices and research solutions.</li> </ul>
<b>Business enterprises</b>	Input suppliers	<ul style="list-style-type: none"> <li>• Provide the market with tailored inputs based on arising needs</li> <li>• Ease access of quality inputs to farmers, women and rural youth and ensure quality standards of inputs</li> <li>• Facilitate payment schemes for producer organizations such as extending payment schedules, providing discounts etc.</li> </ul>

		<ul style="list-style-type: none"> <li>Facilitate collective purchases through traditional and non-traditional and hybrid communication platforms (e.g. online, telephone etc.) to avoid the mobility of individual farmers and provide access to inputs at the urban centres.</li> </ul>
	Medium and large scale agri-food industries and businesses	<ul style="list-style-type: none"> <li>Provide employees with personal protective equipment for a safe working environment</li> <li>Rearrange working schedules to ensure the flexible participation of women, youth, and heads of households adhering to government regulations</li> <li>Develop new marketing tools to compensate for the reduction in sales and customer base (social media platforms, newsletters, radio, mobile delivery, take-away, etc.)</li> </ul>
	Agricultural marketing entities, wholesalers, retail, and logistics suppliers	<ul style="list-style-type: none"> <li>Provide systems for marketing and matching supply and demand during COVID-19 (e.g. online newsletters, regulated prices to benefit both farmers and consumers, marketing advertisements)</li> <li>Increase the monitoring and implementation of safety guidelines during food transportation, especially of fresh fruits and vegetables</li> <li>Ensure better linkages between transport providers, input suppliers and agro-processors through an improved and timely schedule of delivery to minimize post-harvest losses.</li> <li>Consider, where possible, offering delivery options for consumers</li> <li>Provide cold storage facilities for farmers to store their perishable commodities, essential vegetables and milk etc., according to the local context</li> </ul>
<b>Formal and informal bridging institutions (public and private extension and advisory services, farmers organizations, extension agents, commodity groups etc.,)</b>	Public and non-public extension and advisory organizations (incl. NGOs, private sector, extension agents, development partners, etc.)	<ul style="list-style-type: none"> <li>Collaborate with health workers, raise awareness on COVID-19 and on preventive measures, distribute safety equipment and hygienic products etc.</li> <li>Provide targeted advice and information on suitable technologies for household-level food production, labour-saving technologies, information about locally available inputs and varieties and market information</li> <li>Facilitate linkages with other actors to arrange smart transport to market, purchase of inputs, community seed banks, etc.</li> <li>Assist rural producers and mediate for conflict resolution and help resolve tensions among the producers, pastoralists</li> <li>Provide feedback to policy makers and research on issues arising on the ground</li> </ul>

		<ul style="list-style-type: none"> <li>• Train agribusinesses or producer organizations in online marketing techniques using ICT (training online or with safe distancing).</li> </ul>
	<p>Producer organizations, cooperatives, commodity groups/Community-based organizations/ Women, youth, and indigenous peoples' associations</p>	<ul style="list-style-type: none"> <li>• Collaborate with health workers, advisory services, and other actors involved in emergency response to make sure that important information is timely, accessible and available to community members and, provide feedback on community issues to formal and informal bridging institutions.</li> <li>• Raise awareness on COVID-19 and preventive measures among members in different languages based on the target group (e.g. indigenous groups have information in their own language)</li> <li>• Organize smart collective transport arrangements and inputs purchase that would be impossible for an individual producer due to high costs, fewer operators and the need for authorization to travel.</li> <li>• Help community members communicate and exchange information, experience and innovative solutions</li> <li>• Ensure the participation of the most vulnerable organization members as well as non-members who might otherwise be left behind.</li> </ul>
<p><b>Enabling environment involving agricultural and food security policy makers and administrative bodies</b></p>	<p>Centralized and local government agriculture and food security institutions</p>	<ul style="list-style-type: none"> <li>• Systematically dispel any false information and rumours and help farmers, women and rural youth to rely on trusted sources for sharing COVID-19-related information on national television and other official channels</li> <li>• Coordinate with relevant ministries and departments involved in emergency response and lead the coordination of agricultural actor responses</li> <li>• Ensure trade routes are facilitated and address possible gaps in supply chain</li> <li>• Ensure safety nets and food aid are delivered to most vulnerable populations (including women heads of households, youth governed households)</li> <li>• Allocate resources for agricultural research, extension and advisory services to adopt appropriate technologies and practices and also to strengthen local food systems.</li> <li>• Provide incentives for youth and women to innovate and collaborate on response and mitigation response ideas for COVID-19 (such as <a href="#">Hack the pandemic</a>)</li> <li>• Provide flexibility of credit policy during the crisis</li> <li>• In the longer term, improve the infrastructure needed to scale up communication in rural areas</li> </ul>

		<p>(internet, mobile phone, radio).</p> <ul style="list-style-type: none"> <li>• Develop and implement crisis-response strategies relevant for smallholder farmers, rural women and youth</li> <li>• Make cold storage facilities available for farmers to temporarily store their produce especially for perishable vegetables, milk, etc.,</li> <li>• Ensure and regulate the price of essential inputs and commodities in a way that is favourable to both producers and consumers.</li> </ul>
--	--	---

### CAPACITY DEVELOPMENT TO HARNESS LOCAL INNOVATION DURING COVID-19

In the context of the COVID-19 outbreak, developing the capacities of farmers and AIS actors in the food system is a challenge. Nevertheless, improving awareness and knowledge to make use of locally developed innovative solutions is crucial for sustainable agriculture and an effective response to crises. Harnessing local innovation and facilitating co-creation of knowledge is essential to overcoming the difficulties.

If properly harnessed, local innovations can offer **opportunities for dealing with the challenges of unemployment and lack of access to markets and other services during and after the COVID-19 pandemic**. Despite the hardship, the crisis may trigger innovation by governments and farmers in order to overcome the negative impacts of the pandemic.

The capacity to innovate is, therefore, a critical aspect during emergencies such as the current one, where unexpected challenges arise and resilience to shocks is vital. Furthermore, in light of the pandemic and with the world making strides in its efforts to achieve the transformation agenda, there is an urgent need to intensify the use of science and innovative technologies in agriculture and food systems. The current situation of restrictions on movement, physical distancing and other limitations lead to the implementation of smart arrangements to get produce to markets including embracing digital technologies to introduce new methods of selling. For example, digital tools, technologies and services are being used to bring AIS actors and consumers together.

**The following section provides some guidelines on capacity development during the COVID-19 pandemic:**

- While access to formal education institutions and printing material is limited, ICT platforms (such as mobile phones, Internet and radio) should be used to access information on technologies and good practices by smallholders, rural women and youth.
- How-to-use briefs on implementing technologies and good practices and training materials need to be made available to agricultural development practitioners and farmers preferably in local languages.
- Interactions among AIS actors for coordination of responses may be promoted through e-classes, webinars, technology portals, repositories and virtual labs.
- The creation of networks and synergies between women entrepreneurs and young innovators, as well as with the broader business community and relevant associations, will lead to a sense of empowerment and a positive environment for innovation and



knowledge sharing. This requires new and ad-hoc [functional capacities](#), such as facilitation skills, capacity to navigate complexity, to reflect and learn, among others.

- It is important to identify the strengths and weaknesses of youth and women's groups and their members, and to provide technologies and good practices according to their needs, interests and skills.
- In addition to the technical knowledge needed to diversify and increase value of the production, managerial and entrepreneurial skills are crucial.
- It is recommended to provide online education and mentoring programmes and guidance to rural youth about market information, cost-benefit analysis, sourcing of credits, and access to capital.

### ONLINE PORTALS OF TECHNOLOGIES AND GOOD PRACTICES

---

A number of online portals and platforms provide technologies and good practices that can be used by various AIS actors at local level. These technologies and practices can be readily adopted and implemented as part of the COVID-19 response. For example, online portals such as TECA and TAPipedia, maintained by FAO, can be used to promote technologies and good practices and adapt them to the local context.

**TECA:** Technologies and Practices for Small Agricultural Producers ([TECA](#)) is an FAO online platform featuring proven practices and technologies across eleven [categories](#) (crop production, livestock production, fishery and aquaculture, forestry, post-harvest and marketing, agricultural mechanization, natural resource management, nutrition and food security, capacity development, climate change and disaster risk reduction), with over 900 practices available to a global audience.

The TECA platform also includes a [forum](#) to share ideas, learn new practices and connect with other experts. These technologies and practices have descriptive visuals and detailed implementation guidelines for smallholder farmers, producers, and others such as youth. The platform aims to reach a global audience through providing content in four languages (English, French, Spanish, and Portuguese).

**TAPipedia:** Developed within the context of Tropical Agriculture Platform ([TAP](#)), whose secretariat is hosted at FAO, [TAPipedia](#) is an information sharing system designed to enhance knowledge exchange in support of Capacity Development for Agricultural Innovation Systems. Fostering innovation, and in particular the capacity of farmers to innovate, is especially crucial when facing unprecedented challenges and emergencies like the current COVID-19 pandemic. The TAPipedia repository gathers resources related to agricultural innovation in three languages: English, French and Spanish.

A key resource in TAPipedia is the [TAP Common Framework](#): three volumes providing concepts, methodologies and tools to assess capacity development needs and to plan, implement, monitor and evaluate capacity development interventions. In addition, TAPipedia also has a specific section dedicated to [capacity development tools](#) particularly focused on soft skills in relation to agricultural innovation. Other resources include good practices on capacity development, innovation outputs, success stories and lesson learned. The platform mainly targets researchers and development practitioners.

## TECHNOLOGIES AND PRACTICES FOR RURAL YOUTH AND WOMEN DURING COVID-19 PANDEMIC (SOME EXAMPLES)

A selected variety of successful agricultural technologies and practices are presented in this brief to help rural youth and women to mitigate the negative effects of COVID-19. The practical guidelines and practices are specifically significant as they do not rely on expensive, and inaccessible inputs. On the contrary, most resources and materials needed to implement these practices can be found in the vicinity of the households at low cost. These practices and technologies help youth and women in reducing post-harvest losses, promoting innovation in agriculture, providing alternative input sources, and potentially also generating alternative income sources. It is important to note that these practices and technologies when implemented must be adapted and tailored to the local conditions and the challenges posed by COVID-19 since they were not specifically developed for mitigating COVID-19 impacts. One example that has been developed to specifically support and overcome the needs for increased basic hygienic practices during COVID-19, following the most recent advice from the World Health Organization, is the set of [hygiene-related-practices](#) from the Farmer Field School platform. The technologies and practices shared in this brief serve as inspiration and knowledge base for the improvement of the agriculture and food value chains.

The tables below are disaggregated by source and suggest a set of practices/technologies, manuals and guidelines implementable in local contexts and which are especially appropriate for rural youth and women.

**Table 2 | TECA selected practices and technologies addressing the challenges posed by COVID-19**

Objective	Description and added value during COVID-19	Suggested technologies and links to online descriptions
Increase access to agricultural products and nutritious food	Starting vegetable production at the household level can be a quick solution to the loss of access to fresh agricultural produce during the lockdown. In addition to traditional homestead vegetable gardening, innovative methods such as a hydroponic system can motivate rural youth to establish such a system in the household at a minimal cost. Similarly, nutritious leafy vegetables can be grown using sacks, a relatively undemanding practice that could be easily implemented by youth and rural women. Another method for increased food access continuously is to store excess leafy vegetables for later use and reduce trips to market.	<ul style="list-style-type: none"> <li>• Simple non-circulating hydroponic method for vegetables (<a href="#">link</a>)</li> <li>• African leafy vegetables for urban supply and sustainable diets (<a href="#">link</a>)</li> <li>• Vegetable growing (<a href="#">link</a>)</li> <li>• Sack gardens for improved urban diets and livelihoods (<a href="#">link</a>)</li> <li>• Step by step conversion to organic agriculture (<a href="#">link</a>)</li> </ul>
Increase resource use efficiency	With the ongoing crisis, farmers must become aware of the efficient use of inputs such as water, fuel, and compost. Rooftop water collection is a cost-efficient practice that ensures the household a sustainable source of water during drought times. Another input alternative is establishing fuel-saving stoves. For instance, these stoves can be easily built and even sold at a local level. Using more efficient wood stoves requires less wood to cook the same amount of food and hence reduce the need to go out	<ul style="list-style-type: none"> <li>• Rooftop water collection, drip irrigation and plastic mulching in home garden conditions in drought-prone areas (<a href="#">link</a>)</li> <li>• Rooftop collection for schools (<a href="#">link</a>)</li> <li>• Fuel-saving stoves for health, better nutrition and livelihoods (<a href="#">link</a>)</li> </ul>

	<p>to fetch wood in times of limited mobility. Additionally, in times of economic vulnerabilities such as the pandemic, young farmers can generate compost from their household food wastes replacing external inputs. Beekeepers can also benefit from processing propolis into propolis extracts which can be sold as a high value-added product.</p>	<ul style="list-style-type: none"> <li>• On-farm composting methods: traditional methods (anaerobic composting) (<a href="#">link</a>)</li> <li>• How to process raw propolis into propolis extracts (<a href="#">link</a>)</li> </ul>
Reduce post-harvest losses and enhance value addition	<p>In times of harvest, preserving vegetables is an efficient way to increase the shelf-life of leafy vegetables and fruits. Cassava, sweet potato, pumpkin, and papaya are widely eaten in Africa, and their use can be emphasized especially during the pandemic. This technology optimizes already available resources and enhances the nutritional value of food choices. Another important practice is the reduction of post-harvest losses. Such as to prevent on-farm grain damage, smallholders can introduce local plants to control insect damage during grain storage. Similarly, raw beeswax – a product which is often disposed of – can be converted into value-added products such as creams, polish, candles, etc. Income can be generated through the sales of these products and thus compensate for other income losses during a crisis or pandemic.</p>	<ul style="list-style-type: none"> <li>• Preserving green leafy vegetables and fruits (<a href="#">link</a>)</li> <li>• Using plants with pesticidal properties to control insects during on-farm grain storage (<a href="#">link</a>)</li> <li>• Using Eucalyptus leaves to preserve maize and bean seed (<a href="#">link</a>)</li> <li>• How to process the raw beeswax into value-added products (<a href="#">link</a>)</li> <li>• Postharvest handling and utilization of Cactus fruits (<a href="#">link</a>)</li> </ul>
Process food as an additional source of nutrition and income	<p>Lack of access to markets for perishable commodities during the COVID-19 related lockdown may lead to wastage. Enhancing opportunities for food processing and value addition can benefit youth and women by generating more income. These practices are especially important for rural women as they are mostly responsible for the nutritional wellbeing of the entire household. For instance, easy-to-implement, ways of processing and value addition of tomatoes include the preparation of ketchup, tomato paste or jam, which provides women and youth with added income; similar to fruit preservation, and meat drying. Processing sweet potatoes into flour can be used to create a new product with a future brand that can be marketed via online channels or safe delivery. Another method of processing is transforming camel milk into cheese. For additional protein sources, fish heads and tails which are often discarded can be better utilized and transformed into fish by-products. These practices are easy to implement and do not require expensive materials.</p>	<ul style="list-style-type: none"> <li>• Processing tomatoes (<a href="#">link</a>)</li> <li>• Techniques of dried meat production (series of technologies) (<a href="#">link</a>)</li> <li>• Making sweet potato chips and flour (<a href="#">link</a>)</li> <li>• Methods of processing camel milk into cheese (<a href="#">link</a>)</li> <li>• Fish powder (<a href="#">link</a>)</li> </ul>
Promote food and water hygiene	<p>Promoting and establish a value chain for cricket farming for human consumption. This practice can also be used for animal feed. A Tip-tap is a simple water-container hand-washing device, which helps diminish the risks of contamination, improve</p>	<ul style="list-style-type: none"> <li>• Simple tip-taps for improved hygiene and water management (<a href="#">link</a>)</li> </ul>

Specially relevant for women	<p>hygiene and reduce the spread of infectious disease. The case studies indicate that the incidence of infectious diseases, such as cholera and dysentery, has diminished since the use of Tip-taps. Here are two practices on tip-tap, one is a simple tip-tap resource and the other is a detailed <a href="#">booklet developed by the Farmer Field School, focused on hygienic practices for COVID-19</a> that can be implemented at the vicinity of the homes.</p>	<ul style="list-style-type: none"> <li>• A resource handbook focused on hygienic practices for COVID-19 (<a href="#">link</a>)</li> <li>• Cricket farming for human consumption (<a href="#">link</a>)</li> </ul>
------------------------------	--	---

Table 3 | TAPipedia resources relevant for addressing the challenges posed by COVID-19

	Title of the Resource	Summary	Link
Specially relevant for women	<ul style="list-style-type: none"> <li>• ICT-based Customer Care Solution for Poor Farmer [Katalyst Project]</li> </ul>	<p>This case study from Bangladesh focuses on a call-based agriculture helpline service which provides agriculture information solutions to smallholders free of charge. The service particularly helps female farmers with timely information as it reduces their dependence on their male counterparts.</p>	<a href="https://www.tapipedia.org/content/ict-based-customer-care-solution-poor-farmer">https://www.tapipedia.org/content/ict-based-customer-care-solution-poor-farmer</a>
	<ul style="list-style-type: none"> <li>• Developing gender-sensitive value chains - Guidelines for practitioners [Food and Agriculture Organization of the United Nations]</li> </ul>	<p>The purpose of this framework is to facilitate the systematic integration of gender equality dimensions into value chain development programmes and projects.</p>	<a href="https://tapipedia.org/content/developing-gender-sensitive-value-chains-guidelines-practitioners">https://tapipedia.org/content/developing-gender-sensitive-value-chains-guidelines-practitioners</a>
	<ul style="list-style-type: none"> <li>• Bridging gender gaps through innovations in agricultural value chains in Africa [International Association of Agricultural Economists]</li> </ul>	<p>This paper examines innovations for bridging gender gaps in agricultural value chains in Africa. It focuses on innovative platforms for addressing gender gaps in agricultural production.</p>	<a href="https://www.tapipedia.org/content/bridging-gender-gaps-through-innovations-agricultural-value-chains-africa">https://www.tapipedia.org/content/bridging-gender-gaps-through-innovations-agricultural-value-chains-africa</a>
	<ul style="list-style-type: none"> <li>• Supporting Women's Agro-Enterprises in Africa with ICT: A Feasibility Study in Zambia and</li> </ul>	<p>This report examines how ICT-based interventions might be designed to strengthen women's participation in commodity value chains.</p>	<a href="https://www.tapipedia.org/content/supporting-womens-agro-enterprises-africa-ict-feasibility-study-zambia-and-kenya">https://www.tapipedia.org/content/supporting-womens-agro-enterprises-africa-ict-feasibility-study-zambia-and-kenya</a>

	Kenya [World Bank]		
	<ul style="list-style-type: none"> <li>Gender Analysis Tool [Tropical Agriculture Platform]</li> </ul>	The overall goal of this tool is to help to examine the roles played by women and men in innovation partnerships and to better integrate their specific needs and priorities in the interventions planned to innovate.	<a href="https://www.tapipedia.org/content/gender-analysis-tool">https://www.tapipedia.org/content/gender-analysis-tool</a>
Specially relevant for youth	<ul style="list-style-type: none"> <li>Creating jobs for rural youth in agricultural value chains [Technical Centre for Agricultural and Rural Cooperation]</li> </ul>	This brief sets out several youth-inclusive approaches that can help to develop agricultural value chain programmes and mitigate the disruptions in the livelihood of the rural youth.	<a href="https://www.tapipedia.org/content/creating-jobs-rural-youth-agricultural-value-chains">https://www.tapipedia.org/content/creating-jobs-rural-youth-agricultural-value-chains</a>
	<ul style="list-style-type: none"> <li>Young ICT entrepreneurs overcoming challenges and transforming agriculture [Technical Centre for Agricultural and Rural Cooperation]</li> </ul>	The report presents a multidimensional picture of the emerging field of ICT entrepreneurship in agriculture in developing countries and contains success stories and advice for aspiring AgTech entrepreneurs as well as recommendations from youth on how to support their ventures.	<a href="https://www.tapipedia.org/content/innovate-agriculture-young-ict-entrepreneurs-overcoming-challenges-and-transforming-0">https://www.tapipedia.org/content/innovate-agriculture-young-ict-entrepreneurs-overcoming-challenges-and-transforming-0</a>
	<ul style="list-style-type: none"> <li>Youth-Led Innovation: Enhancing the Skills and Capacity of the Next Generation of Innovators [UK's National Endowment for Science, Technology and the Arts]</li> </ul>	The focus of this report is youth-led innovation, whereby young people instigate potential solutions to a problem, often one that they have identified or defined themselves, and take responsibility for developing and implementing a solution. The document offers proposals for encouraging more young people to take part in youth-led innovation.	<a href="https://www.tapipedia.org/content/youth-led-innovation-enhancing-skills-and-capacity-next-generation-innovators">https://www.tapipedia.org/content/youth-led-innovation-enhancing-skills-and-capacity-next-generation-innovators</a>
	<ul style="list-style-type: none"> <li>Youth and innovation in Africa: harnessing the possibilities of Africa's youth for the transformation of the continent</li> </ul>	This report discusses two themes in particular: impediments young people in Africa face as regards innovations in science and technology; and creating an enabling environment for youth and innovation in Africa.	<a href="https://www.tapipedia.org/content/youth-and-innovation-africa-harnessing-possibilities-africa%E2%80%99s-youth-transformation-continent">https://www.tapipedia.org/content/youth-and-innovation-africa-harnessing-possibilities-africa%E2%80%99s-youth-transformation-continent</a>

[United Nations Economic Commission for Africa]		
---	--	--

TABLE 4 | Youth-friendly resources for increased access to agricultural advice and extension

Objectives	Title	Description of the resource	Added value during COVID-19
<b>Increased access to distant learning</b>	<ul style="list-style-type: none"> <li>• Agtube (<a href="#">link</a>)</li> </ul>	Agricultural YouTube with instructional videos on different aspects of farming to provide advice and practical demonstrations for young people (but not only) making it unnecessary to travel and get in close contact with extensionists, crowded demonstration days, etc.	Instructional agricultural videos are highly beneficial as they provide validated information at times where extension service providers, and agricultural trainers are inaccessible.
	<ul style="list-style-type: none"> <li>• Coursera (<a href="#">link</a>)</li> </ul>	Coursera is an online learning platform that offers massive open online courses (MOOC), specializations, and degrees. The website has approximately 40 online courses in Agriculture Management and Sustainability	Women and youth could benefit strongly from access to free online courses that could increase their knowledge on new technologies and practices.
	<ul style="list-style-type: none"> <li>• Access Agriculture (<a href="#">link</a>)</li> </ul>	Access agriculture is a platform used for sharing of videos that enhance the quality of production, harvesting and processing of crops, fruits, vegetables, tubers and cereals. It also includes sections on IPM, sustainable agriculture, business and marketing opportunities.	Access agriculture is a platform that can be accessed online and provides concrete, and hands-on videos on several agricultural technologies and practices.
	<ul style="list-style-type: none"> <li>• Agroecology knowledge Hub (<a href="#">link</a>)</li> </ul>	The agroecology knowledge hub is an FAO-based platform that shares educational, and technical information about agroecology.	The agroecology knowledge hub has strengthened the importance of agroecology in building more resilient farming systems using agroecological methods to meet input and farming demands.

## ENABLING AGRICULTURAL INNOVATION SYSTEM (AIS) ACTORS FOR COVID-19 RESPONSE: CASE STUDIES AND COUNTRY EXAMPLES

**Brazil:** The Brazilian Agricultural Research Corporation (Embrapa) Tabuleiros Costeiros Unit has made available a supply of personal protective equipment (PPE), in addition to alcohol gel, so that agricultural inspectors from the Federal Superintendence of Agriculture (SFA) in Sergipe can continue to carry out their work, which is considered essential in providing society with supplies at this time of COVID-19 crisis. Embrapa Solos (Rio de Janeiro, RJ) also donated PPE to the State Department of Health. There were 216 lab coats, 650 masks, 35 800 gloves and 36 pairs of goggles. The material provided by Embrapa Solos will go to the field hospitals that are being set up in Rio de Janeiro. Read more [here](#) and [here](#).

**Italy:** A new initiative implemented by the federation of Italian farmers and agricultural producers (Coldiretti), enables families having food delivered at home by local producers to buy food for families in need. Fruits, vegetables, flour, cheese and other food – all produced locally – can be paid for by customers, and local producers will deliver directly to disadvantaged families identified by local municipalities. The initiative is part of Campagna Amica and called 'Spesa sospesa', echoing the old habit of paying for an extra coffee that the bar tender will give to someone who cannot afford it. The initiative aims to support both families in need and local food producers, among the most affected by the COVID-19 crisis. Read more [here](#).

**India:** The Department of Agriculture and associated agencies, such as the Vegetables and Fruit Promotion Council (VFPC) and HortiCorp in Kerala, have made extensive arrangements to procure vegetables and fruits from village level Eco Shops and existing cluster markets during the pandemic. The Department of Agriculture has operationalized 302 markets across the State and VFPC has activated 50 markets ensuring the continuity of the food supply chains on the region.

The Knowledge and Resource Centre of Indian Council of Agricultural Research in Krishi Vigyan Kendra (ICAR-KVK) is providing advisory services to help farmers through different WhatsApp groups, newspapers, radio and SMS services during the pandemic. KVK-Kodagu has disseminated crop-specific advice to more than 7 000 farmers through a portal message. A new service of online consultation has also been launched by the Community Service Centres (CSCs) under a *Memorandum of Understanding* with ICAR, so that farmers from remote areas need not visit KVKs. They can instead approach the CSCs established by the government and request timeslots in which to discuss their problems.

Women's self-help groups (SHGs) are also playing a key role in coping with the pandemic in rural India. These groups are proactively involved across many States working on several fronts such as: manufacturing masks and sanitizers; providing information to raise awareness and dispel misinformation on social media; organizing community kitchens; and providing cooked food to homeless and poor persons during the lockdown as well as providing new market approaches – door to door. Read more [here](#).



**Panama:** Vulnerable areas in Panama, including indigenous communities are affected by the difficult situation posed by COVID-19. As a result, the National Coordinator of Indigenous Peoples of Panama (COONAPIP), in partnership with the Rainforest Foundation US in Panama, are implementing a coordinated security project to ensure that the challenges and needs of the indigenous communities are addressed in the face of COVID-19. The output is a web-based application that monitors and tracks the support being provided by governments, indigenous, non-indigenous allies, local and foreign people to these communities. The types of support range from medical supplies, cleaning equipment, and food, to advisory services. The purpose of this tool is to optimize and strategize the focus and support being provided for a better decision-making procedure. In addition, it can improve coordination between traditional authorities and the service providers. The map and tool can be viewed [here](#), and additional details on the technology can be found [here](#).

**Spain:** A local action group has taken a series of initiatives involving key stakeholders on Valle del Jerte, Spain. This region is famous for the cherry production with thousands of families depending on agriculture and agritourism. The initiatives include the production of masks by groups of volunteers organized by the women's organizations and municipalities; job offers in the upcoming cherry season for people who have lost their jobs in tourism; and also helping the cherry sector to develop common protocols for the safety of workers. Read more [here](#).

**West African States:** The Conference of Heads of African and French Agricultural Research (CORAF) is making considerable efforts to support smallholder farmers, seed businesses, and seed cooperatives to mitigate the negative effects of COVID-19. With the support of national seed systems in Economic Community of West African States member countries, the CORAF COVID-19 Emergency Seed Support Initiative will focus on vulnerable farmers, decision makers and seed businesses and be implemented through an online platform. This digital platform will collect, store, and disseminate critical seed related information in each country. The objective is to ensure seed supply during the crisis. Information such as the availability of breeder, access to seeds, seed quality, traceability and market related information such as supply and demand will be shared on the platform. Read more [here](#).

**United States:** The Bayer's Technical Discovery Center (TDC), usually focused on building new devices and machines for agricultural research, is now producing every component of medical protection shield: visors, frames, and rubber bands. Bayer is also working directly with other companies in the community to help them produce medical shields in similar ways to support health care facilities in need. Another Bayer unit is partnering the Iowa state in printing PPE parts through the use of their 3D printers and supplying parts for a number of different initiatives, including from MatterHackers, Landmark, Area 515, VA Hospital, and Mary Greely Medical Center. Read more [here](#).

**Kenya:** Kenyan farmers are adopting new approaches to sales during COVID-19 lockdown. Kenya's farmers and dealers are using social media and farm-based sales to bridge the market gaps during the COVID-19 pandemic. The farmers are aiming to reduce post-harvest losses of fresh products such as fruits and vegetables while improving their ability to acquire key agricultural inputs during the outbreak. As a result, farmers have now shortened the food chain and are selling locally in their towns. They have also observed a shift in agricultural product preference, with people buying more basic vegetables, and avoiding higher-priced items due to economic uncertainty. Read more [here](#).



**Malawi:** ACADES is the largest community of youth in agribusiness and works through the delivery of financing/loans, skills development training and access to profitable markets. As a result of the COVID-19 outbreak, ACADES is introducing an "Online Market Platform" for agriculture/food products, entitled "Shop from Home". This initiative will enable consumers to access agriculture and food products without heading to the markets. ACADES is also playing a critical role in creating awareness and informing communities about this potential threat. Their team is currently in the Lilongwe and Mchinji districts informing the farming communities about the virus, how it is transmitted and ways to prevent its spread. Read more [here](#).

**Lebanon:** In line with the economic and health crisis affecting the world and especially Lebanon, the Environment and Sustainable Development Unit at the American University of Beirut in collaboration with the Lebanese League for Women in Business (LLWB) and the Food Heritage Foundation developed the Ardi Ardak (my land, your land) initiative focusing on small-scale producers especially women. Several activities are supported including the development of lunch boxes, farmer markets, community supported outlets, family meals, community gardens for rural women, food baskets linking the Lebanese diaspora with Lebanese producers (Cedar basket), and urban agriculture through an Herbal kitchen kit.

The initiative aims to link the demand with supply from the most vulnerable, providing technical assistance to farmers and producers, and offering healthy products to urban consumers. During the COVID-19 pandemic, the initiative distributed healthy food boxes to elderly vulnerable families in isolated regions in Lebanon, in addition it distributed 7 500 seedlings along with free technical guidance and assistance to households with small lands to develop and cultivate their land for enhanced food security. More information regarding the initiative can be found [here](#).

### ACKNOWLEDGMENTS

The policy brief was prepared by Mounia Barakat, Matheus Lima, Giulia Palestini, Zofia Mroczek, Manuela Bucciarelli, Charlotte Lietaer, Sónia Dias, Delgermaa Chuluunbaatar, Nevena Alexandrova, Puyun Yang and Selvaraju Ramasamy of FAO's Research and Extension Unit (<http://www.fao.org/research-and-extension/en/>). The brief was edited by Andrew Morris. For more information, please contact: Selvaraju Ramasamy, Head of the Unit ([AGDR-Chief@fao.org](mailto:AGDR-Chief@fao.org)).

