ASEAN Guidelines on the Reduction of Crop Burning

ASEAN Headquarters

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The ASEAN Guidelines on the Reduction of Crop Burning is developed by the ASEAN Member States in consultation with the Food, Agriculture, and Forestry Division (FAFD) of the ASEAN Secretariat.

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EXECUTIVE SUMMARY

ASEAN Member States (AMS) encourage to adopt sustainable agricultural practices that preserve soil health and enhance long-term food security. Comprising a comprehensive strategy for AMS, the ASEAN Guidelines on Crop Burning Reduction can serve as a guidance document for sustainable agricultural practices that offer a clear path forward for achieving a carbon neutral future.

The ASEAN Guidelines emphasise that achieving the reduction of crop burning requires a collaborative effort, where AMS are committed to establishing clear policy framework that incentivise sustainable practices and discourage crop burning, promoting sustainable agricultural techniques and practices, empowering farmers with the necessary skills and knowledge to implement alternatives, developing cost-effective technologies from land preparation to crop residue management, and driving opportunities for products and services derived from sustainable residue management.

ACKNOWLEDGEMENT

The development of the **ASEAN Guidelines on the Reduction of Crop Burning** is the AMS response to the instructions from the 45th ASEAN Ministers of Agriculture and Forestry (AMAF) Meeting in October 2023. This has been a collaborative effort, drawing upon the expertise and dedication of the numerous individuals and organizations from the AMS, as well as the regional development partners from the private and public sectors to support the implementation of the ASEAN Strategy on Carbon Neutrality, the ASEAN Peatland Management Strategy 2023-2030, ASEAN Guidelines on Peatland Fire Management and the Second Roadmap for ASEAN Cooperation on Transboundary Haze Pollution Control with Means of Implementation.

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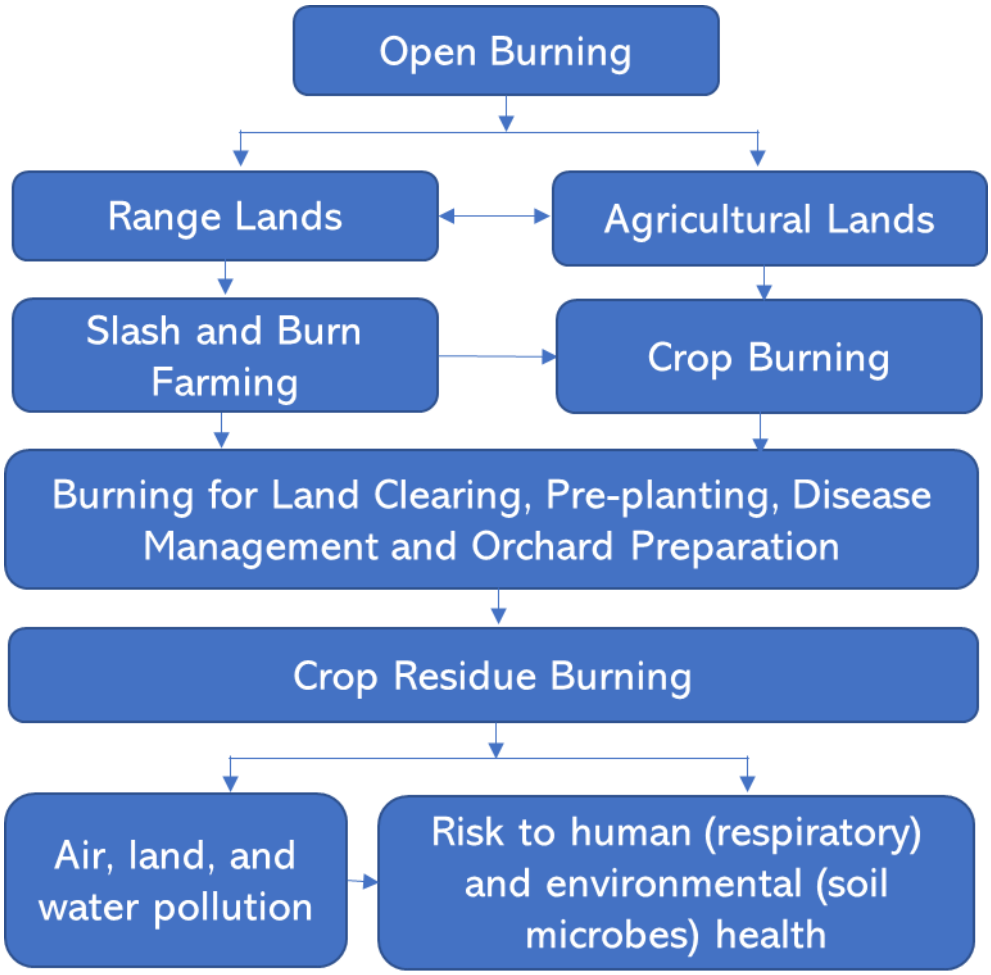
We are grateful to the Food, Agriculture, and Forestry Division (FAFD) of the ASEAN Secretariat for their unwavering support and efficient administrative coordination throughout the Plan's development process. We express our heartfelt appreciation to ASEAN's dialogue partners such as ERIA, GIZ, FAO and the numerous technical experts, practitioners, scientists, and representatives from diverse stakeholder groups who participated in consultations, workshops, and expert meetings. With this, we are confident that the ASEAN

Guidelines on the Reduction of Crop Burning will serve as a valuable reference for building a more resilient, productive, and inclusive agricultural sector in AMS.

I. INTRODUCTION

Crop burning has emerged as a significant environmental, economic and public concern across the countries of the Association of Southeast Asian Nations (ASEAN). In general, this is associated with agricultural burning, which is the intentional and unintentional use of fire for vegetation management in open areas such as agricultural fields, orchards, and rangelands. All types of crop burning practices contribute to severe air and land pollution, loss of livelihood, environmental degradation, and negative health impacts.

Schematic Diagram of Crop Burning in ASEAN



Concerns about crop burning are often linked to the lack of affordable, effective, and technically feasible alternatives, as well as limited methods for utilizing agricultural residues and by-products. Additionally, these practices are influenced by existing traditions and the economic conditions of farmers and their communities. The impacts of crop burning, while

significant, highlight the need for integrated sustainable agricultural practices, changes in community behaviour, and the development of appropriate policy frameworks across sectors and levels to address these challenges and foster positive outcomes.

ASEAN has developed the ASEAN Guidelines on the Reduction of Crop Burning to provide guidance for ASEAN on a range of strategies and instruments that can support the development of solutions and alternatives to crop-burning practices. By implementing the ASEAN Guidelines on the Reduction of Crop Burning, ASEAN expects to reduce the negative impacts caused by crop burning and foster sustainable agricultural practices within the region that protect public health and contribute to mitigating climate change by implementing key strategies. These guidelines will also provide a framework for ASEAN to lead the way toward a future where agriculture and environmental sustainability are achieved collectively and through collaborative efforts among government and non-state actors to promote alternative and environmentally friendly practices.

Reducing crop burning through the implementation of comprehensive guidelines not only addresses environmental concerns but also unlocks significant economic potential. By turning crop residues into valuable products and reducing crop burning, we can create circular agriculture, achieve co-benefits, generate income for farmers, and contribute to sustainable agricultural practices.

II. OBJECTIVES OF THE ASEAN GUIDELINES

The ASEAN Guidelines on the Reduction of Crop Burning are developed to provide a comprehensive framework and roadmap for AMS to collaboratively address the environmental and socio-economic challenges associated with crop residue burning through appropriate policy framework and institutional cooperation across multi-stakeholder groups. These guidelines aim to promote appropriate sustainable agricultural practices that will contribute to minimizing air pollution, protecting public health, preventing soil and landscape degradation, and mitigating climate change impacts caused by the burning of agricultural residues, as well as improving livelihood.

Through the adoption of these guidelines, AMS strives to:

1. Advocate for the adoption of sustainable agriculture, including the use of innovative technologies, best practices, and alternative residue management methods to minimize crop burning.
2. Safeguard public health by reducing the emission of harmful pollutants to improve air quality, and minimize respiratory and other health issues caused by crop burning, and provide options for sustainable practices that support new livelihood opportunities.
3. Encourage cooperation, information exchange, and capacity building among AMS, research institutions, and stakeholders, including relevant ASEAN sectoral bodies, ASEAN Regional Centres and ANNEX 1 entities of the ASEAN Charter to share

knowledge, experiences, and expertise related to sustainable crop residue management that reduces environmental pollution.

4. Set policy framework with clear and measurable goals and targets for reducing crop burning by fostering a collective commitment to transition towards implementing responsible agricultural practices through certification, incentivisation, and resource mobilisation.
5. Establish monitoring and evaluation mechanisms to assess the progress and effectiveness of the Guidelines' implementation, allowing for continuous improvement and identification of successful strategies for scaling.

III. SCOPE AND COVERAGE OF APPLICATION

As a comprehensive framework and roadmap for AMS to collaboratively address the environmental and socio-economic challenges associated with crop residue burning, the ASEAN Guidelines on the Reduction of Crop Burning, will specifically cover the application of an integrated approach to sustainable and achieve circular agriculture from addressing the issue of open burning involved from agricultural land preparation to post-harvest crop residue management.

The integrated approach will include using innovative technologies, undertaking capacity-building initiatives, and developing knowledge-sharing mechanisms and cooperation across different stakeholders including public and private sector institutions. In promoting the approach, the AMS will be guided by the Guidelines in developing and improving policy framework for reducing crop burning practices with key considerations to the diverse agricultural landscapes, the priority crop varieties grown in each AMS as well as the context-specific nature of these practices. Finally, it offers options for various mechanisms for implementing the AMS' agriculture sectoral goals at regional, national, and local levels.

IV. GUIDANCE ON STRATEGIC ELEMENTS FOR REDUCING CROP BURNING

Developing a comprehensive strategy for tackling the issue of crop burning is crucial for AMS. To give them quick access to the means for creating the enabling environment for achieving this purpose, the Guidelines highlight important elements that can serve as leverage points for an integrated approach to sustainable and circular agriculture. The AMS can be guided by different strategies that look at developing and enhancing the (i) **Sustainable Agriculture Practices**, (ii) **Knowledge and Skills of Stakeholders**, (iii) **Research and Technological Innovation**, (iv) **Policy Systems**, and (v) and **Prospects for New Market from Sustainable Agriculture Practices**. In this regard, AMS can make use of this guidance to operationalise these strategies and meet the objectives of these Guidelines, which is intended to build on the prevailing opportunities for implementing viable solutions for the reduction of crop burning at the national and regional levels.

A. Planning for Policy System

Developing and enhancing the policy framework for reducing crop burning and promoting integrated sustainable agricultural practices require a comprehensive approach. The framework must reinforce clear policies and guidelines that govern crop residue management, farm practices, and air pollution control measures and can align efforts towards a common objective, provide clarity to stakeholders, and facilitate consistency and coherence in implementation. Setting clear policies can empower authorities in monitoring and assessing the adoption of sustainable agricultural practices. This will also help encouraging the adoption of alternative residue management methods. By establishing transparent reporting mechanisms and instituting monitoring systems, further adoption and accountability from stakeholders can be appropriately conducted.

Some key considerations for the AMS in developing and implementing this strategy include:

- Developing a policy system that consider the diverse agricultural practices, scale of operation, and economic realities and consider a gradual implementation to allow stakeholders to adapt and adopt the alternative practices while providing support and resources during the process.
- Providing capacity building for institutional structures that will implement well-defined policies on effectively identifying and addressing crop burning practices by working with communities and other stakeholders or by using technologies for monitoring and evaluation.
- Cooperating and involving of various stakeholders including policymakers, agricultural institutions, private sector players, and local communities to transition to circular agriculture. Each of these stakeholders plays a crucial role in creating a supportive environment for sustainable agricultural practices and ensuring the successful implementation of the guidelines. By fostering cooperation and aligning efforts results in harnessing the benefits of circular agriculture collectively, this will lead to improved livelihoods, environmental sustainability, and economic growth

B. Promoting Sustainable Agricultural Practices

Encouraging the development and adoption of sustainable agriculture practices is a crucial strategy within the ASEAN Guidelines on the Reduction of Crop Burning which should be aligned with the ASEAN Regional Guidelines for Sustainable Agriculture adopted by AMAF in 2022 and support the implementation of the ASEAN Strategy on Carbon Neutrality.

First, by prioritizing sustainable agriculture practices, ASEAN can minimize the detrimental environmental impacts associated with crop burning through the use of cover crops, mulching, composting, and precision agriculture techniques that can help retain soil fertility, reduce soil erosion, conserve water resources, manage diseases and enhance biodiversity.

Second, adopting zero-burn techniques, recycling of residues, and controlled residue incorporation, maintain air quality, mitigate respiratory issues, and reduce the incidence of health problems related to smoke exposure.

Third, implementing agricultural practices can contribute to climate change mitigation by reducing GHG emissions resulting from crop burning. They can help sequester carbon in the soil, enhance soil organic matter content, and reduce the release of carbon dioxide, methane, and other GHGs into the atmosphere.

Some key considerations for the AMS in developing and implementing this strategy include:

- Promoting the adoption of viable, cost-effective and practical alternatives and techniques like agroforestry, conservation agriculture, and integrated pest management that can enhance carbon sinks, soil fertility, improve the resilience of agroecosystems, manage disease outbreaks, increase productivity and diverse income sources, and mitigate the adverse effects of climate change within the ASEAN region.
- Developing location-specific recommendations based on environmental factors such as climate, soil type, crops grown and available resources as well as social factors related to skills, capacity, and knowledge to ensure the promoted practices are suitable according to the site and community traditions.
- Establishing learning sites and demonstration plots showcasing different residue management techniques using available technologies such as using cut-soiler and products derived from agricultural residues such as biochar, compost or biofuels through multi-biomass treatment process, microbial saccharification and bio-methanation, and application of biogas effluent and shallow subsurface drainage

C. Facilitating Skills and Knowledge Building

Enhancing the skills and knowledge of stakeholders in implementing the Guidelines holds immense significance in fostering behaviour change, promoting informed decision-making, and building a culture of sustainable agricultural practices that can curb crop burning in the ASEAN region. Through knowledge building, farmers and other stakeholders will have a common understanding of the detrimental effects of crop burning, the benefits of sustainable residue management alternatives, and the application of viable technologies and resources that can contribute to practices for achieving long-term agricultural productivity, profitability, and environmental stewardship.

By disseminating information, best practices, and case studies, AMS can equip farmers, extension workers, and relevant institutions with the necessary skills and tools to make informed decisions regarding practical residue management approaches. This process encourages active engagement by various stakeholders, including farmers, local communities, NGOs, research institutions, and government bodies. Through platforms for dialogues, knowledge exchanges, and collaborations, AMS will drive the conversations toward achieving positive change, one that mitigates the impacts of crop burning, and further builds the future where sustainable and circular agriculture becomes the norm.

Some key considerations for the AMS in developing and implementing this strategy include:

- Developing programs tailored to the specific needs and knowledge levels of identified target groups which include farmers, extension workers, policy makers and community leaders with consideration of the specific agricultural practices, cultural norms and traditions and economy to ensure that the content is relevant to local communities.
- Offering a mix of learning methods to cater to learning styles which can include training, field demonstration, hands-on workshops, online courses or mobile learning that can be combined with modern techniques and would facilitate peer-to-peer learning opportunities and foster the sense of ASEAN community and trust.
- Providing extension service providers and field technicians with knowledge and skills on best practices and techniques for sustainable residue management and a system for monitoring the effectiveness of policies for crop burning reduction through sustainable agricultural practices.

D. Fostering Research and Technology Innovation

Fostering research and applicable technology innovation for agriculture has always been a key strategy in driving economic growth, technological advancement, and societal progress. As AMS ventures to more interventions that reduce crop burning practices, it will lead to the creation of new knowledge, services and products that can drive agricultural productivity, attract investments, and stimulate economic growth in the rural areas. By investing in agricultural research and innovation in this area, AMS will have the opportunity to create and diversify the agricultural economy and market streams and sources, improve traditional practices and knowledge, create new industries, and achieve sustainable and circular agricultural systems.

The advancements in agricultural technologies resulting from the research and innovation on sustainable management of crop residues are likewise expected to contribute to environment friendliness, improving production efficiency, and developing new agricultural products and services. It could drive transformative changes across the sector and impact the use of energy, food, and transportation for more sustainable alternative practices that maximize waste consumption, promote clean technologies, and contribute to environmental sustainability.

Some key considerations for the AMS in developing and implementing this strategy include:

- Identifying the most pressing challenges related to crop residue management in different ASEAN countries, considering the dominant crop types, residue characteristics, and existing technology, mechanisation, and infrastructure services and balancing them with research efforts that will contribute to near-term solutions and address the immediate challenges as well as long-term innovations that have transformative potential for sustainable and circular agriculture.
- Creating platforms for researchers and technicians to share findings, and best practices and developing research collaborations between government, universities, research institutions, and private sector entities across AMS to encourage venture capital partnerships and financing mechanisms to facilitate commercialisation, foster

exchange programs for knowledge and technology transfer, and adopting products to specific agricultural practices, resource availability, and infrastructure limitations.

- Developing affordable and user-friendly equipment for processing crop residues into valuable products like compost, mulch, or biochar that can be readily adopted by farmers and stakeholders as well as technologies that include efficiently converting biomass into biofuels, biogas into ethanol, creating incentives for residue utilisation and reducing reliance on conventional energy sources and fossil fuels.

E. Creating Co-Benefits and Prospects for New Markets from Sustainable Agriculture Practices

The reduction in crop burning practices can open doors to several new market opportunities that will co-benefit the stakeholders of sustainable agriculture practices. First, as AMS develop and implement policies that disincentivise crop burning practices and incentivise sustainable practices, they can expect an increase in environmentally and socially conscious consumers that will give high preference to products grown sustainably. It will create a market pull for commodities that do not undergo the process of crop burning. By working with the private sector, AMS can explore certification and labels that farmers and retailers can use to indicate the application of sustainable practices, or reward carbon credits by avoiding GHG emissions, which can be sold to other companies and organisations to offset their own emissions.

Meanwhile, developing the markets for crop residues can facilitate new value chains from which new products and services could emerge. For example, both AMS and businesses could invest in processing plants for biochar production, biogas facilities or composting sites which will develop entrepreneurship. Since farmers shift away from burning, the innovation stream will be activated and will encourage local businesses to participate in creating new markets that later will increase the demand for services such as infrastructure development, efficient logistic networks and agricultural equipment.

Some key considerations for the AMS in developing and implementing this strategy include:

- Increasing the demand for products and services without crop burning by launching consumer awareness and education programs that highlight the benefits of reducing crop burning, by adopting clear and informative labels that explain the environmental impact and benefits for consumers that prefer them, and by collaborating with stores and retailers to promote the products from sustainable agricultural practices.
- Incentivising sustainable products and services that support the reduction of crop burning. This can include the development of transport and logistic networks as well as providing financial assistance to investors, new entrepreneurs, and equipment manufacturers.
- Building transparent systems for certifying the products and services that support the reduction of crop burning such as robust traceability systems that allows consumers to track the origin of their products through the application of digital technologies such as

blockchain, AI, and IoT and by organising education programs on these technologies for farmers and retailers.

V. CAPACITY BUILDING AND KNOWLEDGE SHARING

The specific contributions of the transitional elements and strategies to the objectives of reducing the detrimental impact of crop burning are the positive rippling effects that benefit various stakeholders. The implementation of these strategies can be effectively supported and leveraged by a two-pronged approach centred on capacity building and knowledge sharing. Since the implementation of the Guidelines requires the participation and involvement of different sectoral groups, the approach is multi-tiered, context-specific, and may be implemented in phases, which can be likewise relative to the intended interventions by AMS.

A. Capacity Building

Capacity building includes programs and activities that enable individuals and groups to acquire the knowledge, skills, and resources necessary to transition from harmful crop-burning practices to sustainable alternatives, and foster a positive impact on various aspects of society. It can catalyse change by empowering farmers and agriculture workers with the necessary tools and techniques to manage crop residues effectively and by promoting sustainable practices such as composting, mulching, use of machinery, and precision farming. By implementing capacity building starting with the farmers, AMS can achieve the following expected outcomes:

- **Bridging the Knowledge Gap:** AMS expressed their concerns that many of the farmers in the region have resorted to crop burning due to a lack of awareness about sustainable alternatives for managing waste. Capacity-building programs can equip them with the knowledge and skills required to adopt viable alternative practices and applicable technologies through training workshops and extension services that can provide practical demonstrations and guidance on implementing the techniques effectively.
- **Empowering Innovation:** As crop-burning practices are mostly done by farmers, AMS can transform them by becoming active participants in finding solutions and alternatives. Likewise, to foster a sense of ownership and increase the likelihood of long-term adoption of alternatives, AMS can lay down the enabling environment that will allow other stakeholders to work with them such as encouraging and promoting sustainable practices that will suit the farmers' specific needs and local contexts.
- **Investing in the Future:** Training programs for farmers and extension workers can be considered an investment in the future of ASEAN's agricultural sector. Through these activities, AMS is not only equipping the stakeholders with the knowledge and skills needed for sustainable residue management, which gives the assurance of long-term environmental benefits and potentially increases farm productivity, but likewise

encourages private sectors and business organisations to include these activities in their investment portfolios.

B. Knowledge Sharing

In the face of the detrimental environmental and health impacts caused by crop burning practices, collaboration and cooperation among AMS are essential to address this regional challenge effectively. This collaboration and cooperation include the exchange of valuable insights and experiences regarding the initiatives on the reduction of crop burning, sharing best practices, lessons learned, and success stories. This will enable AMS to learn from one another, accelerating the adoption of sustainable alternatives and effective policies, and fostering innovations by collectively identifying and implementing strategies that align with their respective agricultural systems, cultural contexts, and policy frameworks.

Knowledge sharing among AMS has a multiplying effect that could elevate the region's forward-thinking and promote responsible regional communities that are foundational to broader partnerships and cooperation with other stakeholders with mutual interests in promoting these Guidelines. The knowledge sharing among AMS entails the following:

- **Learning from Peers:** Implementing exchange programs and workshops across stakeholder levels are powerful tools for knowledge sharing. For example, farmers learning from each other's experiences and successes with sustainable practices can facilitate the building of trust and confidence that can further inspire wider adoption.
- **Leveraging Local Knowledge:** There are indigenous and practical agricultural practices that hold valuable insights to communities that can be shared through various knowledge platforms. They can help facilitate the integration of viable traditional practices with modern techniques, thereby creating a more holistic approach to residue management.
- **Spreading Awareness Beyond the Farm:** Since knowledge sharing isn't limited to farmers, the conduct of community outreach programs can educate society about the negative impacts of crop burning and the benefits of sustainable agriculture. This will foster community support for change and encourage responsible consumer choices.

In general, capacity building and knowledge sharing are synergistic approaches that can work together when implementing the transitional elements and strategies of the Guidelines. As capacity building empowers farmers to adopt new practices, knowledge sharing fosters a continuous learning environment for further improvement. Through this cycle of continuous learning and adaptation, ASEAN will move closer to eradicating crop burning in the region.

VI. STAKEHOLDERS INVOLVED IN REDUCING CROP BURNING IN ASEAN

As a significant concern in the ASEAN region, crop burning would require a multi-stakeholder approach for its effective reduction. In this section, a breakdown of the key stakeholders and their expected roles in tackling this challenge are presented. Likewise, this section provides

the different avenues for promoting the multi-stakeholder approach through cooperation and collaboration with regional organizations on key action programs.

Stakeholders	Intended Roles
Individual farmers or farmer groups that are directly involved in agriculture and land management activities	• Adopt sustainable residue management practices like composting, mulching or incorporation in farm preparation. • Share and collaborate with other stakeholders on their success and experiences for wider adoption and updating of new technologies and practices
Agricultural extension service providers that are involved in the training programs and demonstration sites	• Bridge the knowledge gap by providing relevant up-to-date information and techniques on sustainable alternatives of crop burning practices. • Facilitate guidance and support in designing, implementing, monitoring and evaluating effective solutions to inform policy decisions.
Research institutions that are developing technologies for reducing the crop burning practices (i.e. JIRCAS, FAO, IRRI, GIZ, and others)	• Develop technology to reduce crop burning that suits the specific needs and limitations of ASEAN agriculture. • Disseminate and package research findings and best practices through publications, workshops, and collaboration with extension services
Government agencies that are responsible for developing policy framework for reducing crop-burning practices	• Establish and/or update policies that discourage crop burning and incentivise the adoption of sustainable practices through financial assistance, subsidies, or tax breaks. • Set up and implement a monitoring mechanism (preferably in collaboration with civil society groups, NGOs and local communities) • Foster regional cooperation between AMS is crucial sharing best practices, coordinating research efforts, and harmonising policies across AMS
Private sector and business communities that could cater to technology and market creation to support the reduction of crop-burning practices	• Invest in research and development of innovative solutions for residue management, such as equipment manufacturing, or commercialisation of bioproducts derived from crop residues. • Establish markets for products derived from agricultural residues, creating new income streams for farmers and economic incentives for sustainable practices such as loan programs and investment opportunities.
Civil society groups, NGOs and local communities that contribute to public awareness and mobilisation of sustainable agricultural practices	• Develop and share information on the negative impacts of crop burning and promote sustainable practices by advocating policy changes. • Participate in the implementation of practices that reduce the impact of crop burning and involve in monitoring and evaluating the effectiveness of practices.

A. Culture of Cooperation and Partnership to Support Crop Burning Reduction

As a multi-stakeholder approach, the importance of seeking cooperation and partnership with regional and international organisations for financial and technical support in addressing crop

burning cannot be overstated. These entities could provide AMS with vital resources, expertise, and a platform for collective action, facilitate effective measures to reduce crop-burning practices and promote sustainable agriculture.

These organisations can either provide financial or technical support to AMS in implementing transitional elements and strategies to combat crop burning. First, adequate funding can be allocated towards capacity-building programs, research initiatives, and the development and implementation of sustainable agricultural practices. As the implementation may be programmatic and in phases, the financial support can help build AMS' ability to effectively transition towards alternative methodologies for the reduction of crop burning.

Second, technical support brings valuable expertise and knowledge to developing the methodologies. As some organisations already possess experience in implementing mixed-modal strategies for sustainable agriculture, environmental conservation, and air quality management, partnering with them can allow AMS to access technical guidance, advisory services, and knowledge-sharing platforms that contribute to evidence-based decision-making and promote the adoption of best practices.

Finally, collaborating with regional and international organizations in supporting efforts to reduce crop burning enhances the visibility and credibility of these initiatives at the national and local levels and strengthens advocacy for sustainable agricultural practices on a regional scale. This, in turn, can attract further investment and support from international donors, private sector entities, and other stakeholders who recognize the importance of addressing both the environmental and health impacts of crop burning.

B. Scaling Collaboration through Regional Action Programs

To amplify the individual actions and to further align the cooperation and partnerships across borders that will pave the way for a more cohesive and integrated approach to reducing crop burning and its associated consequences, this Guidelines put forward the following menu of actions programs for AMS to consider in exploring the crucial cooperation and partnerships with regional organisations toward the effective implementation of transitional elements:

- **Farmer-to-Farmer Exchanges:** Facilitate exchange programs where farmers from different AMS can share their experiences and successes in adopting sustainable practices, which will foster peer-to-peer learning and allow for the adaptation of techniques to local contexts.
- **Online Knowledge Hub:** Develop a centralized online platform for sharing information on best practices, research findings, and technological advancements related to residue management, which can be translated into local languages for wider accessibility of the strategies by intended local users:
- **Technology Transfer and Adaptation:** Encourage cooperation between research institutions that will facilitate the transfer and adaptation of existing successful technologies from one AMS to another, which will reduce the duplication of efforts and accelerates the adoption of proven solutions.

- **Public-Private Partnerships:** Foster partnerships between government, research institutions and private companies to accelerate the commercialization of promising residue management technologies. This can involve joint ventures, technology licensing agreements, and co-funding research projects.
- **Market Access for Sustainable Products and Services:** Develop markets for agricultural products grown using sustainable practices and help create market access for farmers who adopt sustainable residue management and incentivizes others to follow suit.
- **Financial Incentive Mechanisms:** Collaborate on establishing a funding mechanism to support farmers in transitioning to sustainable practices, which could involve providing subsidies for equipment, financial assistance for infrastructure development (composting facilities, biochar and biogas facilities), or tax breaks for adopting sustainable techniques.

These action programs for regional cooperation and partnerships when implemented by AMS can leverage collective resources, share best practices, and accelerate progress towards reducing crop burning. Through a unified approach, combined with national action plans and stakeholder collaboration, these actions will pave the way for a cleaner and healthier future for the ASEAN region.

VII. CONCLUSION

The ASEAN Guidelines emphasises collective action, which is paramount in reducing crop burning within the ASEAN region. As understood, the detrimental environmental, health, and socioeconomic impacts of this practice require a concerted effort from all AMS.

AMS, at first, can leverage its collective expertise, resources, and experiences to develop and implement sustainable solutions that effectively tackle the crop-burning issue. However, through collective action, AMS benefits from the regional unity and cooperation within ASEAN toward a shared commitment to achieving holistic sustainable development coupled with environmental conservation, while promoting the well-being of communities.

Through the application of approaches on capacity building, knowledge-sharing, technical and financial assistance, market creation, and regional cooperation and partnerships expressed in these Guidelines, AMS can learn further from each other's successes and challenges in reducing crop burning. The exchange of best practices, fosters innovation, accelerates the adoption of sustainable alternatives, and ensures a faster transition towards environmentally friendly agricultural practices.

The cooperation and partnerships with regional and international organizations are also equally crucial as financial and technical support from these entities provides the necessary resources, expertise, and credibility to address crop burning comprehensively in the ASEAN region. By collaborating, AMS and other institutions can leverage their collective influence and become beacons in addressing the crop-burning challenges.

As the ASEAN Guidelines allow AMS to enhance the effectiveness of their interventions and amplify their impact on a broader scale, developing the integrated and programmatic approach to implementing the strategies and initiatives are expected to pave the way for a better ASEAN region, where green environment thrives, social behaviour has positively shifted, public health is safeguarded, and community livelihoods are flourishing because of the reduction in crop burning practices.

Annex 1

AN INTEGRATED APPROACH TO REDUCING CROP BURNING IN ASEAN – COMPONENTS AND STRATEGIES OF A REGIONAL PILOT PROJECT

Crop burning poses significant challenges to environmental sustainability, public health, livelihood and climate change mitigation within the ASEAN region. To address this pressing issue, ASEAN developed the ASEAN Guidelines that outlined the key components of a comprehensive strategy and roadmap to reduce crop burning through collaborative efforts among AMS and in partnership with international and regional organisations.

The objective of this proposal is to adopt sustainable agricultural practices, promote technology adoption, develop standards, provide incentives, increase income and encourage the development of new products and services for crop residue management, not limited to straws, stalks, and stubbles of crop varieties such as rice, cassava, and corn, and raise awareness at the national and regional levels to effectively mitigate the adverse impacts of crop burning.

In this regard, to minimize crop burning, AMS can consider the following project components and strategies in the draft proposal in consideration of the above-mentioned objectives:

- **Promoting Sustainable Agricultural Practices:**
    - Encourage the adoption of alternate methods for crop residue management to reduce crop residue burning by 50% within three to five years by advocating the use of sustainable techniques such as incorporating residues into the soil as organic matter or using it as animal feed, and creating new products such as biochar
    - Highlight the benefits of sustainable practices, including soil enrichment, reduction in methane emissions and climate smart agriculture, increase in income and decreased air pollution through training and awareness building
    - Promote mechanization and innovation by facilitating the training and support of farmers for adopting machinery and technologies that can efficiently collect, process, and utilize crop residues, and thereby minimizing the need for burning

- **Providing Incentives and Support to Sustainable Agriculture Practices**
    - Introduce financial incentives, such as subsidies or grants, to encourage farmers to adopt sustainable practices and invest in equipment that facilitates efficient crop residue management.
    - Allocate resources for infrastructure development and markets for straw, stalks and stubble-based products of different crops such as collection centres, storage facilities, and processing plants.
    - Support opportunities for sellers and buyers of crop residue products and services to create the market and explore the potential for business on selling carbon credits

- **Research and Development:**
    - Develop the baseline for crop burning in each AMS and conduct feasibility studies and market analysis to understand the economic viability, social acceptability, and environmental impact of the crop residue burning management
    - Invest in research and development by allocating funds for research initiatives aimed at finding innovative solutions for land preparation and crop residue management not limited to straws, stalks and stubbles utilization, including the development of high-value products, bioenergy production, and other innovative applications.
    - Foster collaborative research partnerships among research institutions, agricultural experts, and industry players both within ASEAN and globally, to share knowledge, resources, and best practices on crop residue management.

- **Stakeholder Engagement and Awareness:**
    - Conduct comprehensive training programs to educate farmers about the environmental and economic advantages of sustainable crop residue management practices and provide technical guidance on implementation.
    - Launch extensive awareness campaigns targeting both urban and rural populations and emphasizing the harmful effects of crop burning on land and air quality, public health, and climate change to encourage individuals to support initiatives that promote sustainable agriculture.
    - Prioritise and focus resources on technologies that can be adopted and most suitable according to diverse agricultural practices, crop types, and resource availability for farmers to benefit from new and appropriate technologies

- **Policy Development:**
    - Develop and implement policies on the reduction of crop burning by disincentivisation, by encouraging sustainable agriculture practices, and developing a monitoring system
    - Foster collaboration among AMS to harmonise policies and share best practices by establishing a regional target on the reduction of crop burning, adhering to standards for certification, data-sharing mechanisms, and exploring further joint initiatives.
    - Develop a monitoring framework consisting of a comprehensive system for monitoring that includes using satellite surveillance such as fire mapping detection at national and regional scale, and evaluate the progress made in reducing crop burning and to track key indicators such as the adoption of sustainable practices, reduction in burning incidents, and the development of alternative residue utilization methods.

- **Market Access for New Products and Services:**
    - Establish or support specialized incubators and accelerators focused on fostering innovation on crop residue management as these programs provide startups with crucial resources like mentorship, training, and access to funding.
    - Invest in infrastructure development to improve logistics and transportation networks that will facilitate the efficient movement of raw materials (crop residues) to processing facilities and finished products to markets.
    - Simplify trade regulations and procedures to facilitate the export of products derived from sustainable residue management practices to open farmers and retailers' access to wider markets and increases income potential for producers.

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