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TEMPLATE FOR SUBMISSION

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↗ https://www.fao.org/fsnforum/call-submissions/voluntary-code-conduct-sustainable-use-plastics-agriculture

CALL FOR SUBMISSIONS:
Towards the development of a Voluntary Code of Conduct on the sustainable use of plastics in agriculture

Template for submissions (maximum 2000 words in total)

In the context of the development of the Voluntary Code of Conduct on the sustainable use of plastics in agriculture (VCoC), FAO's Office of Climate Change, Biodiversity and Environment (OCB) invites you to submit your feedback on the questions below, and to share good practices and lessons learned on the sustainable use of plastics and agriculture and their alternatives.

You are welcome to respond to any of the , as per your interest and expertise. Your responses, alongside the feedback we gather during our ongoing webinar consultations, will help inform the first full draft of the VCoC.

You can provide your feedback by answering questions in any of the six UN languages (English, French, Spanish, Russian, Arabic and Chinese).

To take part in this Call for submissions, please get registered or login to your account on the FSN Forum website; and upload the completed submission form on the dedicated webpage. For any technical support regarding downloading or uploading the submission form, please send an email to fsn-moderator@fao.org.

The Call for Submissions is open until November 7, 2023.

Template for submissions
(maximum 2000 words in total)

1. Proponent (name and surname; email address; country)

David Newman, dn@bbia.org.uk UK

2. Name of organization and organization type: Academia and research, Government; IGO; Independent Consultant; NGO, Private Sector, PRO; Standard Setting; Trade association (if applicable)

Bio-based and Biodegradable Industries Association

3. Gender (Female; Male; Other; Prefer not to say)

Male

4. Reducing problematic plastics

Some plastic materials and products used in agriculture are unnecessary, avoidable, problematic, or short lived. A VCoC could recommend their banning, reducing or phasing out. Examples include products made of polyvinyl chloride (PVC); oxo-degradable plastics; non-biodegradable polymer coated fertilizers; mulching films; and bale film and nets.

Which plastics polymers, substances or products the VCoC could recommend banning, reducing or phasing out?

A product should always be designed with an efficient and appropriate end-of-life solution in mind. Plastic items which risk leaving persistent contamination during their use or end-of-life should be recommended for banning or gradual elimination. This can be the case where efficient collection and removal of the items is not possible. For conventional plastic mulch films, a minimum thickness of 30 micron would allow for proper removal from soil, reducing the possibility of spilling plastic residues in the environment. Materials that are designed to physically disappear without proving the complete mineralization in mesophilic conditions and absence of ecotoxic effects (for example according to EN 17033 or ISO 23517 criteria) should be banned. This includes oxo-, photo, and enzyme-mediated polymers, which are not in line with the main international standards on biodegradability and compostability. They should be restricted from use as already mentioned in the EU Directive 2019/904 (Single Use Plastic).

5. Alternatives and substitutes

Solutions to improve the sustainability of plastics used in agriculture include adopting agricultural practices that avoid the use of plastic, or substituting plastic products with other materials, including biobased and biodegradable alternatives. For example, some fishing gear components could be biodegradable; plastic mulch could be substituted with cover crops in some applications.

What guidance should the VCoC include on plastics alternatives and substitutes?

Depending on the application, substituting conventional plastics materials with appropriate types of bioplastics can offer different solutions to improve the sustainability of the plastic items in terms of their environmental impacts and their circularity.

Bioplastics comprise a whole family of different materials. A plastic material is defined as a bioplastic if it is either biobased, biodegradable, or features both properties. For almost every conventional plastic material and application there is a bioplastic alternative available that offers the same or, in some cases, even better properties and functionalities.

In the context of agricultural applications, all plastic items that can be easily collected and recycled can be substituted with biobased, non-degradable materials. Biobased plastics can be recycled in existing recycling infrastructures. They have the environmental advantage of reducing the dependency on fossil resources and reducing greenhouse gas (GHG) emissions or even be carbon neutral. Moreover, biobased plastics can make a considerable contribution to increased resource efficiency through a closed resource cycle and use cascades.

For agricultural plastics items (such as threads, clips, nets, shelters…) that are likely to end up in green waste streams, the substitution with compostable plastics alternatives makes sense. It is necessary to always clarify the environment in which biodegradation is supposed to take place and support these claims with certifications and labels based on the according standards (e.g., EN13432 for industrial composting).

For other conventional plastic applications known to be at high risk of releasing plastic in the soil (such as polymers for slow-release fertilizers, seed coating, tree guards and mulch films), soil-biodegradable alternatives should be implemented.

Mulch films made from soil-biodegradable plastics provide significant benefits where retrieval, recycling, and reuse of conventional plastics pose serious problems. They are specifically designed to biodegrade effectively in situ and can therefore be incorporated into the soil post-harvest.

Soil-biodegradable mulch films should be certified according to EN 17033 or ISO 23157, which ensures they pass comprehensive ecotoxicity testing and strict thresholds concerning other harmful substances. The required testing includes plant growth test, acute or chronic earthworm test, and nitrification inhibition testing. Additionally, there are strict rules when it comes to the usage of regulated metals, SVHCs, and PFAS.

6. Reuse and sustainable design

Some plastic products are necessary and cannot be replaced by alternative practices or materials. In some cases, their lifespan can be increased by promoting reuse and repurpose. In addition, labeling, product standards and design can reduce the environmental impact of plastic life cycle: for example, mandatory plastic mulch thickness can ensure its retrieval and prevent the generation of microplastics.

How could the VCoC improve the sustainability of plastics products used in agriculture through guidance on products reusing, repurposing, standards and design?

Plastic materials for agricultural applications should be designed according to eco-design principles, facilitating their recovery and recycling after use according to the specificity of different areas and their specific waste infrastructure.

For conventional plastic mulch film, a minimum thickness of 30 micron would allow for proper removal from soil, reducing the possibility of spilling plastic residues in the environment. According

to Deconick (CIPA congress, 2018), the thinner the film the higher the probability of plastic materials which cannot be properly retrieved from the field and the more difficult and expensive the removal operation. It has been estimated that with a 10 micron-thick film, 68% of plastic residues will remain in the soil. With a 25 micron-thick film, this will be reduced to 10%.

For other conventional plastic applications known to be at high risk of releasing plastic in the environment (such as polymers for slow-release fertilizers, seed coating, clips, threads, nets used in greenhouse, and tree shelters), soil-biodegradable or compostable alternatives should be implemented.

Specific standards and certification schemes should be made available to plastic products considering the best characteristics and good practice to reduce the dispersion in the environment.

7. Selection criteria

Trade-offs may become evident when assessing a fossil-based plastic product against an alternative. For example, many biodegradable products are more expensive than their fossil-based counterparts but will possibly have lower end-of-life treatment costs as they can be left to biodegrade in situ or taken for composting, usually a lower cost option than landfilling and incineration (in developed waste management systems). Plastic products and their alternatives should be assessed and compared across their life cycle and for all dimensions of sustainability including food security, food safety and nutrition. Management options should be assessed for each particular application and in specific contexts.

What guidance should the VCoC include to balance the benefits and trade-offs of plastics and their alternatives?

For biodegradable and compostable products an accurate calculation of the overall costs connected to the end-of-life of the materials (including all external operations avoided outside of the farm, and the possibility of improper end-of-life management such as burning or burying in the field) and the environmental benefits (such as that no persistent microplastics are released in the environment) should be evaluated in proper Life Cycle Costing (LCC) over a long-time period and in comparison with conventional products and practices. At present, environmental externalities are not taken into account when calculating the cost and impacts of conventional or new materials, while they should have an increasing importance in view of the challenges represented by the degradation of soils. Note that at present in LCC, the impacts associated with the release of microplastics are not quantified.

Even though Life Cycle Assessments (LCA) are the most systematic way to understand the interrelation between a product system and the environment (including biodegradable products), some specific issues related to the nature of biodegradable products require a more detailed way to be properly addressed. Current LCA methodologies cannot be considered fully fit for purpose when it comes to comparing soil-biodegradable mulch films with traditional ones (i.e., non-biodegradable and fossil-based).[1] LCA results are greatly case-dependent and influenced by numerous choices. Product characteristics, system boundaries, and LCA modelling need to be carefully considered to

[1] See: EUBA position on the JRC LCA Methodology, available online at https://docs.european-bioplastics.org/publications/EUBA_Position_on_JRC_LCA_Methodology.pdf

allow a realistic assessment. If done so, as shown in a study by the European Commission[2], soil-biodegradable mulch films perform significantly better than non-biodegradable mulch films on a cradle-to-grave basis for seven out of eight impact categories for which a comparison was possible. The ameliorative results of biodegradable mulch films, including categories like acidification and eutrophication, were also possible thanks to a lower consumption of plastic required (due to the lower thickness) and the absence of a removal and disposal phase as required for traditional mulch films.

When performing comparative LCA's on mulch films, numerous points need to be taken into consideration, as for example:

- Removed mulch films are usually heavily soiled and polluted with pesticides and fertilisers, therefore making recycling a difficult option
- Soil organic carbon is removed together with natural nutrients
- Microplastics accumulation of non-biodegradable mulch films
- Non-removal results in reduced energy need
- Certified soil-biodegradable mulch films already passed comprehensive ecotoxicity testing and strict thresholds concerning other harmful substances in line with EN 17033.

8. End-of-life and EPR schemes

After its intended use, it is paramount that plastic waste is retrieved and is not left contaminating the environment. Waste collection, recycling and disposal can be driven by the establishment of Extended Producer Responsibility (EPR) schemes. In addition, it is important to address the issues of illegal dumping and open burning. MARPOL Annex V and LC/LP already addresses illegal dumping and disposal of plastic waste from sea-based activities. Traceability mechanisms can also support compliance and enforcement activities.

What guidance should the VCoC include on the end-of-life management of agricultural plastics waste, including through Extended Producer Responsibility (EPR) schemes?

In many EU Member States voluntary EPR schemes are implemented, leading to a collection of plastic waste reaching from 75% to 90% of the plastic used for packaging.

We believe that for those materials which are too contaminated (soiling) and expensive to collect and recycle (such as mulch films, clips, threads, nets, etc.), biodegradable and compostable alternatives should be used in order to implement the overall quantity of recycled plastic waste (at present, only 36% of plastic materials from agriculture are recycled in the EU, according to EUNOMIA report (2021)).

For soil-biodegradable mulch films, EPR schemes are not applicable. Soil-biodegradable mulch films need not be removed from the field at the end of the crop cycle; instead, they are to be incorporated

[2] European Commission, Directorate-General for Research and Innovation, Environmental impact assessments of innovative bio-based product. Task 1 of "Study on Support to R&I Policy in the Area of Bio-based Products and Services ", Publications Office, 2019, available online at https://op.europa.eu/en/publication-detail/-/publication/15bb40e3-3979-11e9-8d04-01aa75ed71a1

into the soil and buried to allow the biodegradation of film materials to progress with the activity of microorganisms. Thus, producers of soil-biodegradable mulch films should be exempt from EPR schemes as there are no post-consumption collection costs necessary.

9. Microplastics

Micro and nano-plastics pollute agricultural soils and oceans, and are harmful to ecosystems, animals, and potentially human health. Sources of microplastic pollution in agriculture include sewage sludge application, the use of non-biodegradable polymer coated fertilizers, seeds and pesticides, and the use of non-biodegradable dolly-rope.

How could the VCoC support the reduction of microplastics pollution in agriculture?

It is important to reduce all possible sources of plastics spilling into the environment, either accidentally or because they are not properly collected. All available measures to properly collect plastics should be put into place, beginning with eco-design requirements and limiting the use of products that can spread microplastics (intentionally and unintentionally), to implementing national and international policies to enforce environmentally correct behavior. Technical standards should be drafted to guide the best practices for the end of life.

Biodegradable polymers have the advantage of not eroding into permanent secondary microplastics upon degradation, because most natural environments habit microbes that are able to metabolise these polymers. Thus, the residence time is considerably lower for biodegradable polymers compared to conventional plastic materials.[3] This way, biodegradable plastics can help to minimise environmental impacts and reduce the accumulation of plastic particles in different environmental habitats.

Soil-biodegradable mulch films can support the reduction of microplastics in agricultural soils. The European standard EN 17033 sets the requirements for biodegradation of mulch films used in agriculture and horticulture. They include complete biodegradation in less than two years, comprehensive ecotoxicity testing considering all relevant exposure pathways, and clear best practice guidelines. Unlike mulch films made of conventional PE that lead to an accumulation of plastic particles in soil – even after cultivation is ceased -, biodegradable films do not cause accumulation in soils.[4]

For conventional plastic mulch film, a minimum thickness of 30 micron would allow for proper removal from soil, reducing the possibility of spilling plastic residues in the environment.

Compostable alternatives to agricultural plastics items (such as threads, clips, nets, shelters, etc.) that are difficult to retrieve and likely to end up in green waste streams, can help to reduce microplastics in compost. If they are certified according to EN 13432, they biodegrade alongside the green waste in industrial composting plants.

[3] M. Tosin et al., Biodegradation kinetics in soil of a multi-constituent biodegradable plastic, Polymer Degradation and stability, Volume 166,pp. 213-218, 2019

[4] OWS, Expert Statement "(Bio)degradable mulch films", 2017, available at https://docs.european-bioplastics.org/publications/OWS_Expert_statement_mulching_films.pdf

10. Stakeholder engagement

Multistakeholder engagement is necessary to promote active and meaningful participation in the development and implementation of the VCoC. The VCoC may target a broad range of stakeholders including governments; manufacturers, installers, distributors of plastic products or their alternatives; farmers, foresters and fishers; Indigenous Peoples, youth, and waste collectors, recyclers and disposers, both from the formal and informal sectors.

How to ensure (and what guidance is needed for) meaningful engagement of all relevant stakeholders in the development and implementation of the VCoC?

Proper certification and standardization are necessary guidelines for the sector. It is important to have coherent and homogeneous standards around the world.

It would also be beneficial to implement Community Engagement programs with grower groups and Agricultural Extension Services to promote the benefits of certified alternatives for the sector. With wide adoption, best practices can be rolled out, and greater community benefit can be had.

11. Financial instruments, technical assistance and trade

The VCoC could recommend incentives for financial institutions to create instruments (e.g. EPR schemes) to promote circular economy of plastics in agriculture. Technical assistance could support assessments, development of alternatives, skills and capacity building. Trade policies can support a more sustainable management of agricultural plastics by restricting or banning the import of plastic products that do not respect products standards.

What financial incentives, priorities for technical assistance and trade measures could be included in the VCoC?

Financial incentives at government level to growers and growers' associations (such as Common Agriculture Policy in EU) related to the materials/products with a lower environmental impact should be planned and linked to the standards defining the characteristics and end-of-life of materials/products in order to overcome the price gap between the traditional and innovative solutions. We recall that fossil-based plastics have benefited from 100 years of oil and gas infrastructure and significant subsidies using public funds which have enabled the scale of the industry we know today, producing in excess of 400 million tpa of plastics. Bioplastics have enjoyed no such subsidies and have a scale of circa 1% of total plastic production and are therefore at a price disadvantage.
In order to have an effective application of improved measurements, technical assistance should be planned and supported at government level within dedicated policies. For example, the Spanish Government within the Common Agricultural Practices included as Environmental Measurements for the Organization of Producers economical support for growers using biodegradable mulch films (certified according to EN 17033) and for compostable products (such as clips) – in the Real Decreto 857/2022 de 11 octubre.
Additionally, it is necessary to provide funding for research to allow for science-based decision making when implementing more sustainable practices.

12. Regulatory and enforcement mechanisms

Good practices to support regulatory and enforcement mechanisms that could be included in the VCoC include: product registration, product licensing, product standards, licensing of actors in the supply chain, licensing users of plastic products, traceability mechanisms, and labelling with usage and end-of-life management instructions.

How could the VCoC provide guidance on efficient regulatory and enforcement?

In order to have efficient regulatory and enforcement of good practices, it is essential to properly mark the materials/products using clear labelling (e.g.: conformity to standards) and prepare recommendations for the end-of-life adapted to the different applications. Any financial support should be given only to products showing proper traceability via certification and relevant labelling.

13. Research and knowledge gaps

Research gaps need to be addressed to inform effective policies for the sustainability of plastics used in agriculture, including among others: the impacts of macro, micro and nano plastic pollution on soil, plants and animal health, food safety and human health; the effectiveness of biodegradable plastics and alternative materials; the economic viability and farmers perception around these options.

What are key research gaps around plastics used in agriculture, and how can the VCoC recommend addressing them?

Proper and shared characterization methods for detection of micro- and nano- plastics; analysis of environmental fate of plastics and bioplastics in soil and transfer to other habitats; need of homogeneous data on plastics (macro-, meso- and micro- plastics) in the agricultural soil, and effects related to quantities. Implementing R&D programmes for improving biodegradable and compostable technological solutions to reduce plastic waste spread in the environment.

14. Implementation arrangements

Typical FAO Codes of Conduct provide an overarching framework under which more detailed guidelines, standards and tools are developed. It is important that Codes of Conduct are kept up to date with the latest policy, scientific and technological developments. Codes of Conduct are supported by technical committees that meet regularly to review developments, recommend improvements and new subsidiary guidance.

What technical aspects should be regularly reviewed to keep the Code up to date, and how could the Technical Committee(s) be structured to best review these aspects?

15. Structure of the VCoC

Different options for structuring the VCoC exist to ensure it efficiently targets all agricultural subsectors (crop and livestock, forestry, fisheries and aquaculture). For example, the VCoC could focus primarily

on terrestrial agriculture, and include fisheries and aquaculture only by cross-referencing existing policies and guidelines. Alternatively, the VCoC could have an umbrella structure valid for all subsectors, followed by specific guidelines for different subsectors (crop and livestock, forestry, fisheries and aquaculture). Finally, the VCoC could have an umbrella structure valid for all subsectors, followed by guidelines on specific aspects (including for example, durable/single use products, licensing, labelling and EPR Schemes).

Which structure would be more efficient in targeting all agricultural subsectors?

It is important to differentiate between soil and aquatic medium, since the two environments and the materials/products used are very different from one another as well as the according biodegradability standards. Thus, the VCoC should focus primarily on terrestrial agriculture.

16. Agrifood value chains stages

The VCoC could encompass different stages of the agrifood value chains. It could target plastics used solely for primary agricultural production; it may also include plastics used for agrifood storage, transport, processing and distribution; and finally, it may include the entire agrifood value chain from production to consumption, including consumer packaging.

Which stages of the agrifood value chains should be covered by the VCoC?

In the first stage, the VCoC should concentrate on plastics used in agriculture and acquaculture sectors in order to be more focused. Food packaging could be involved in a second stage but is already subject to considerable legislative activities across the globe. There is little to be gained from an additional FAO voluntary code on food packaging, as these are already in place (eg Ellen MacArthur Foundation Global Comittment, Plastic Pacts etc).

17. Good practices and lessons learned

Good practices for the sustainable management of plastics and their alternatives can be found in all regions of the globe. Please leave below any information regarding specific applications, good practices, lessons learned, and innovative approaches on the management of plastics in agriculture and their alternatives.

We should recall here the EU commitment to ban the use of microplastic additives to products that could be released in soil and water including fertilizers. This becomes an opportunity for the use of soil biodegradable polymers in fertilizer production and the substitution on a global scale of the use of non-biodegradable microplastics to encapsulate fertilizer pellets. See https://ec.europa.eu/commission/presscorner/detail/en/ip_23_4581

18. Links and additional comments

Eunomia report:

https://www.eunomia.co.uk/reports-tools/investigating-options-for-reducing-releases-in-the-aquatic-environment-of-microplastics-emitted-by-products/;
https://publications.jrc.ec.europa.eu/repository/bitstream/JRC110629/jrc110629_final.pdf

JRC Report:

https://publications.jrc.ec.europa.eu/repository/bitstream/JRC110629/jrc110629_final.pdf

OWS, Expert Statement "(Bio)degradable mulch films":

https://docs.european-bioplastics.org/publications/OWS_Expert_statement_mulching_films.pdf

EUBP Position Paper on microplastics:

https://docs.european-bioplastics.org/publications/pp/EUBP_PP_Biodegradable_plastics_do_not_cause_persistent_microplastics.pdf

EUBP End-of-life guidelines for soil-biodegradable mulch films:

https://docs.european-bioplastics.org/publications/EUBP_Soil_biodegradable_mulch_films_EOL_Guidelines.pdf

EUBP Fact Sheet on standards and labels for biobased and biodegradable plastics:

https://docs.european-bioplastics.org/publications/fs/EUBP_FS_Standards.pdf

More EUBP publications: https://www.european-bioplastics.org/news/publications/