Factsheet
Bioplastics 101

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Relevance to the Pacific Islands

Pacific Island countries, like others around the world, are evaluating their plastics use. The global bioplastics market (bio-based and/or biodegradable plastics) is projected to increase in the next decade, with their use in a range of sectors including agriculture/horticulture, aquaculture, fisheries, and food and non-food packaging. While in restricted and specific applications they may bring some advantages over conventional durable fossil-based plastics,[1] caution is required to ensure these materials do not become regrettable substitutions, presenting hazards to organisms and human health,[2, 3] or contributing to social, economic and environmental burdens.[4] This fact sheet aims to provide Pacific Islands delegates the scientific evidence necessary to negotiate Core Obligation 8: Safe, Sustainable Alternatives and Substitutes (UNEP/PP/INC.2/4) and Part II Section 5d of the Zero Draft (UNEP/PP/INC.3/4) in a fully informed manner.

Key Terms

There is a lack of consistency regarding the use of the terms below which can result in considerable confusion.

Bioplastics is a term that includes plastic materials made of biodegradable polymers (including those from fossil carbon sources) and plastics composed of bio-based polymers (*Fig1- in blue and green*).[1] The term is not used consistently leading to confusion; therefore, its use is not recommended.[8]

Bio-based plastics are composed or derived, (entirely or partially), from renewable, biological products (including plant/forestry, animal, and marine biomass). They are not necessarily biodegradable or compostable *(Fig 1-in green*).[6]

Biodegradable plastics can be made from renewable or fossil carbon sources and are intended to biodegrade more rapidly than conventional plastics but require specific conditions (*Fig 1- in blue*).[1]

Biodegradation of plastics is a 'system property' requiring a) material properties that allow for microbial conversion into methane or carbon dioxide, water, mineral salts, new microbial biomass, and b) suitable conditions in the receiving environment (microorganisms, temperature, pH, moisture etc.) such that biodegradation can take place.[1]

Compostable plastics is a subset of biodegradable plastic (*Fig 1- in purple*). While some are intended to be 'home compostable', most need to be collected and transferred to appropriate industrial facilities.[7]
This distinction may not be adequately labelled on products.

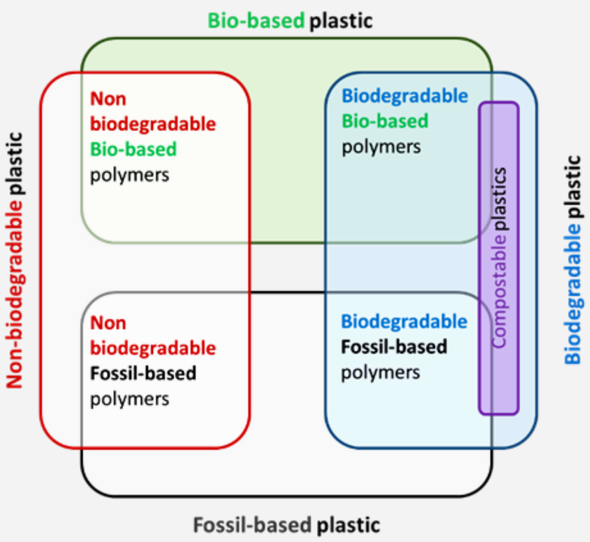

Fig 1. Categories of bio-based, fossil-based, biodegradable, and non-biodegradable plastics. The conflated term 'bioplastics' comprises i) fossil-based biodegradable polymers, ii) bio-based biodegradable polymers and iii) bio-based non-biodegradable polymers.[1

Why it is important for the Global Plastics Treaty to address this topic?

Absence of consistent definitions and product labelling: The terms "bioplastic", "bio-based", "biodegradable" and "compostable" plastics are inconsistently applied due to a lack of universally adopted definitions. This results in ambiguous product descriptions and/or labelling, and confusion relating to material properties, disposal pathways, and potential benefits. [9-11]

Ecological effects: As with conventional plastics, bio-based and biodegradable plastics may contain a variety of chemicals including those shown to adversely affect human health and the environment. [12-14] If biodegradable plastics accumulate in the environment, they may generate microplastics and/or release chemical additives more rapidly than non-biodegradable plastics.[15]

Reducing plastic production is crucial and cannot be achieved by substituting fossil-based carbon with bio-based sources [5] as high use of bio-based sources would also result in increased demand for monocropping leading to biodiversity loss, increased use of synthetic pesticides and fertilizers, water, GHGs, and potentially land diversion from food production.

The **infrastructure needed for the industrial degradation of bio-based and biodegradable plastic waste is lacking** in most locations including across the Pacific Islands region. Separating biodegradable from non-biodegradable plastic can be challenging, leading to contamination which can compromise the recycling of conventional plastics, and industrial degradation seldom hold plastics with biodegradable properties long enough at optimal conditions for complete biodegradation. [16, 17]

Specific considerations relating to biodegradable and compostable plastics:

In certain applications, the property of biodegradability could offer advantages over conventional plastics, provided that complete mineralization is achieved within an appropriate product-specific timescale, and that chemical additives do not result in environmental harm. Any benefits of biodegradability must be assessed and prioritized according to the zero-waste hierarchy. [19, 20]

Standards for biodegradability and compostability: Biodegradation is an essential part of natural biogeochemical cycles, and degradation rates vary considerably depending on the physical, chemical and biological properties of the receiving environment (e.g., soils or oceans compared to industrial facilities).[21] Most plastic biodegradation standards rely on laboratory tests and/or relate to degradation in industrial facilities which may not be relevant where the plastics are used or disposed of in natural environments.

How the Global Plastics Treaty can most effectively address this topic:

Regulate all plastics (regardless of carbon source)

Establish an independent, multidisciplinary expert body to develop safety, sustainability, and essentiality criteria for all plastics, including the extraction of feedstocks intended for bio-based plastics production, and chemicals associated with bio-plastic polymers and products.

Mandate clear, consistent definitions for bio-based, biodegradable and compostable plastics, and **accurate labelling** based on International independent standards including information on renewable feedstock content, transparency regarding associated chemicals, and disposal.

Promote the use and development of comprehensive, inclusive, and harmonised life cycle assessment (LCA) tools to evaluate the environmental, health, and socio-economic impacts of bio-based and biodegradable plastics throughout their life cycles, including associated chemicals and persistent particles. [24-26]

Require international biodegradation standards appropriate to the potential end-of-life environment: Standard tests should demonstrate environmentally relevant biodegradability without the release of toxic chemicals, across environments (e.g., in different soil types, at the sea surface, marine and freshwater sediments), and waste management (e.g., sewage, digester, and home and industrial composters).

Design products for reduction, reuse, repair, remanufacture, repurpose, and recycling while ensuring they do not interfere with existing recycling schemes.

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Scientists' Coalition for an Effective Plastics Treaty

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References: Please go to the Scientists' Coalition Bioplastics Policy Brief for the full list of references.

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