Definition:

$$\frac{Aboveground\ Biomass}{Area\ of\ land}$$

Description

Benefit: This impact area refers to the total weight of all aboveground, harvestable parts of cultivated plants. It is suitable, where production is to be used for energy and other non-food purposes that can utilize the whole plant. Woody crops and forage crops will show high efficiencies in this impact area.

Resource: Agricultural land is always a limited resource. The type of land can be specified to distinguish between different land qualities. Distinctions are often made, for example, between cropland and pasture, high nature value (HNV) farmland and other farmland, or based on soil fertility and yield potential. For this indicator, the temporal reference must always be specified. However, in case of the standard period of one year, this information is sometimes omitted in scientific publications.

Correlation with soil management

[157] For sustainable agricultural systems is required to improve the efficiency of crop nitrogen recovery and to reduce gaseous and leaching losses. #Poultry manure, rice hulls and mineral fertilizer combination may represent a good soil amendment to obtain a high yield with a lower environmental impact, at least in the short-term.
[253] Use of mulch helps to retain soil moisture, it can provide room for farmers to reduce the frequency and amount of irrigation.
[268] Nitrogen (N) efficient maize (Zea mays L.) varieties capable of producing higher maize grain yields under conditions of low soil N supply and infertile soils condition.
[274] Result suggests that in the presence of superabsorbent polymer, maize leaf and grain carbon isotope discrimination could be good indicators for evaluating maize water use efficiency during periods of low rainfall.

Strength & weaknesses pertaining to measurement of this impact area

Biomass: Total amount aboveground biomass (production is generally easy to measure. However, the informative value is limited where they do not account for qualitative differences between types of biomass and are not accompanied by information on site conditions such as local climate or soil fertility. Therefore, comparisons between efficiencies of different production processes with regard to yields should only be made where products and site conditions are similar. In some cases, it may be advisable to select alternative indicators where the type of benefit is more clearly defined (e.g., energetic value, financial benefit).

Area of Land: While area of land is a standard measure that is used as reference in most statistics and inventories, a weakness of this indicator is that other relevant information like soil type, soil fertility or management history is often not provided.
In short, one hectare of dry, sandy cropland soil is very different from one hectare of pasture on drained peat soils.

Sample Indicators

Indicator values from		Survey	
Experiment or direct measurement		Statistical- or census data	
Expert assessment		Literature values	
Model		Maps or GIS	
Stakeholder participation		Not provided	

Table 1: Field Scale

Indicator	**Unit**	**Indicator values from**
[253] Weed biomass during wet (W) and dry (D) seasons for lowland (IR-841) rice varieties/Area of land	Mg mulch * ha^{-1}	
[253] Weed biomass during wet (W) and dry (D) seasons for upland (Nerica-4) rice varieties/Area of land	Mg mulch * ha^{-1}	
[268] Non-reproductive aboveground biomass accumulated from flowering to harvest/Area of land	Mg * ha^{-1}	
[268] Aboveground biomass at flowering/Area of land	Mg * ha^{-1}	
[274] Above-ground biomass/Area of land	g * ha^{-1}	

Table 2: Farm Scale

Indicator	Unit	Indicator values from
[157] Total plant biomass/Area of land	kg * m^{-2}	

Reference

ID	Citation	[1]Soil type/ texture
157	Machado, D., et al. (2010). "The use of organic substrates with contrasting C/N ratio in the regulation of nitrogen use efficiency and losses in a potato agroecosystem." Nutrient Cycling in Agroecosystems 88(3): 411-427.	Sandy-loam texture
253	Totin, E., et al. (2013). "Mulching upland rice for efficient water management: A collaborative approach in Benin." Agricultural Water Management 125: 71-80.	n/a
268	Worku, M., et al. (2012). "Nitrogen efficiency as related to dry matter partitioning and root system size in tropical mid-altitude maize hybrids under different levels of nitrogen stress." Field Crops Research 130: 57-67.	Eutric Fluvisol ; Reddish brown clay soil (Nitosol, FAO soil classification)
274	Yang, W. and P. F. Li (2018). "Association of carbon isotope discrimination with leaf gas exchange and water use efficiency in maize following soil amendment with superabsorbent hydrogel." Plant, Soil and Environment **64**(10): 484-490.	Sandy loam

[1]**Soil type/ texture:** If provided, what are type and texture of the soils studied in the paper?