## Classification of agricultural, environmental, and economic outcomes that were included in the systematic map

We used this hierarchical classification of agricultural, environmental, and economic outcomes for coding, via drop-down menus in our data-entry forms. This list was intended to be generic enough to apply other crops, as a secondary aim of this systematic map was to test whether a consistent intervention and outcome classification could be developed for agriculture. We used “n.e.c.” (not elsewhere classified) categories to capture outcomes that were not listed at lower levels, and made new interventions when these categories indicated that common interventions were missing. We did not include outcomes on livestock, farmer behaviour, or cassava physiology that were not directly relevant to cassava quality, or molecular biology (e.g., enzyme activities, molecular markers, gene expression, or genetic diversity).

**All outcomes**

**10. Crops**

**-- 10.10. Crop yield**

*10.10.10. Crop yield*

* Crop yield (including harvest index)
* Crop biomass (including inedible components; e.g., the stems of some crops)
* Crop propagules (including cuttings and seeds not used for food, feed, fuel, etc.)

*10.10.NEC. Crop yield, n.e.c.*

**-- 10.20. Crop quality (including cash crops and cover crops)**

*10.20.10. Crop appearance (including the size and shape of the edible parts)*

*10.20.20. Crop cooking quality*

*10.20.30. Crop storage quality*

*10.20.40. Crop taste (including acidity, texture, etc.)*

*10.20.50. Chemical composition of crops*

* Dry matter content (i.e. proportion or percentage; also see "Crop yield" for dry matter yield)
* Calories
* Fibre content
* Carbon (not including soil organic carbon)
* Macronutrients (for plants)
* Nitrogen (N) in plants (including biological nitrogen fixation)
* Phosphorus (P) in plants
* Potassium (K) in plants
* Vitamins and provitamins (e.g., vitamin A or beta-carotene)
* Micronutrients and other elements (e.g., calcium [Ca] and magnesium [Mg])
* Toxins
* Agrochemicals in crops (e.g., pesticide residues)
* Heavy metals in crops (e.g., lead [Pb] or mercury [Hg])
* Toxins in crops, n.e.c. (e.g., cyanide)
* Macronutrients (for people)
* Fat
* Protein
* Starch
* Sugar
* Ash content

*10.20.NEC. Crop quality, n.e.c.*

**10.30. Crop damage, infection, and infestation (also see "pathogens, pests, and weeds")**

*10.30.10. Crop damage or infection by pathogens (e.g., disease severity)*

*10.30.20. Crop damage or infestation by pests*

*10.30.30. Crop damage by weeds*

*10.30.NEC. Crop damage, n.e.c.*

**-- 10.40. Crop growth and survival**

*10.40.10. Crop growth*

* Plant growth rate (e.g., photosynthetic rate or radiation use efficiency [RUE])
* Plant size (e.g., canopy cover, ground cover, leaf area index [LAI], or height)

*10.40.20. Crop survival (e.g., germination rate)*

*10.40.NEC. Crop growth and survival, n.e.c.*

**20. Soil**

**-- 20.10. Soil structure and function**

*20.10.10. Soil aggregation and erosion*

* Soil aggregation
* Soil erosion (including soil loss through harvesting)

*20.10.20. Soil compaction, porosity, and water content*

* Soil compaction
* Soil porosity/infiltration rates (including hydraulic conductivity)
* Soil bulk density
* Soil water content

*20.10.30. Soil chemistry*

* Soil carbon (C) and soil organic matter (SOM)
* Soil inorganic carbon
* Soil total carbon
* Soil organic matter (SOM)
* Soil organic carbon (SOC)
* Soil salinity (including sodium [Na])
* Soil micronutrients and secondary nutrients (e.g., calcium [Ca] and magnesium [Mg])
* Soil nutrient leaching (including nitrate leaching [NO3-])
* Soil mineralization (decomposition from organic to inorganic forms)
* Electrical conductivity (EC)
* Cation exchange capacity (CEC)
* Soil pH
* Soil macronutrients
* Nitrogen (N, including ammonium [NH4+] and nitrate [NO3-] in soils)
* Phosphorus (P) in soils
* Potassium (K) in soils

*20.10.40. Soil respiration (also see "pollutants (including greenhouse gases)")*

*20.10.50. Soil temperature*

*20.10.60. Soil texture (i.e. sand, silt, and clay content)*

*20.10.NEC. Soil structure and function, n.e.c.*

**-- 20.20. Soil organisms (also see "biodiversity" and "pathogens, pest, and weeds")**

*20.20.10. Soil microbes (not including pathogens), n.e.c.*

* Fungi (including mycorrhizae)
* Bacteria (including nitrogen-fixing bacteria)
* Soil enzymes
* Soil microbial biomass

*20.20.20. Earthworms*

*20.20.30. Nematodes (not including pests)*

*20.20.NEC. Soil organisms, n.e.c.*

**30. Water**

**-- 30.10. Water quantity (use/loss)**

*30.10.10. Irrigation*

*30.10.20. Evapotranspiration (including water use efficiency [WUE])*

*30.10.30. Runoff*

*30.10.40. Drainage*

*30.10.NEC. Water quantity (use/loss), n.e.c.*

**-- 30.20. Water quality**

*30.20.10. Anoxia and eutrophication*

*30.20.20. Biocides in water (e.g., herbicides/pesticides)*

*30.20.30. Nutrients in water*

*30.20.40. Sediments in water*

*30.20.NEC. Water quality, n.e.c.*

**40. Pathogens, pests, weeds, and invasive species**

**-- 40.10. Animals (pests and invasive species)**

*40.10.10. Pests (invertebrates)*

* Parasitization of invertebrate pests (see "Wildlife" for parasitoid abundance)
* Predation of invertebrate pests
* Invertebrate pest abundance (not measured in the crop; see "Crop damage" for infestation rate)
* Invertebrate pest diversity

*40.10.20. Pests (vertebrates)*

* Predation of vertebrate pests
* Vertebrate pest diversity
* Vertebrate pest abundance (not measured in the crop; see "Crop damage" for infestation rate)

*40.10.NEC. Animals (pests and invasive species), n.e.c.*

**-- 40.20. Plants (weeds and invasive species)**

*40.20.10. Plant abundance (weeds and invasive species)*

*40.20.20. Plant diversity (weeds and invasive species)*

*40.20.NEC. Plants (weeds and invasive species), n.e.c.*

**-- 40.30. Pathogens**

*40.30.10. Pathogens (bacteria)*

*40.30.20. Pathogens (fungi)*

*40.30.30. Pathogens (viruses)*

*40.30.NEC. Pathogens, n.e.c.*

**50. Pollutants (including greenhouse gases)**

**-- 50.10. Air pollution**

*50.10.10. Particulate matter (including dust)*

*50.10.NEC. Air pollution, n.e.c.*

**-- 50.20. Greenhouse gases**

*50.20.10. Carbon dioxide*

*50.20.20. Methane*

*50.20.30. Nitrous oxide*

**-- 50.30. Soil pollution**

*50.30.10. Biocides in soils (e.g., herbicides/pesticides)*

*50.30.20. Heavy metals in soils*

*50.30.NEC. Soil pollution, n.e.c.*

**60. Chemicals and energy**

**-- 60.10. Agrochemicals**

*60.10.10. Biocides (e.g., herbicides/pesticides)*

*60.10.20. Fertilizers and other soil amendments (e.g., nitrogen use efficiency [NUE])*

*60.10.NEC. Agrochemicals, n.e.c.*

**-- 60.20. Energy**

*60.20.10. Electricity*

*60.20.20. Fuel (e.g., tractor fuel)*

*60.20.NEC. Energy, n.e.c.*

**70. Money, labor, and time**

**-- 70.10. Money**

*70.10.NEC. Money, n.e.c.*

**-- 70.20. Labor**

*70.20.10. Animal labor*

*70.20.20. Human labor*

*70.20.NEC. Labor, n.e.c.*

**-- 70.30. Time (not including labor measured in person-hours, etc.)**

*70.30.NEC. Time, n.e.c.*

**80. Land**

**-- 80.10. Agricultural land**

*80.10.10. Land equivalency ratio (LER)*

*80.10.20. Area-time equivalency ratio (ATER)*

*80.10.NEC. Agricultural land, n.e.c.*

**-- 80.20. Semi-natural land**

*80.20.10. Semi-natural land use (e.g., area conserved)*

*80.20.NEC. Semi-natural land, n.e.c.*

**90. Wildlife (including pollinators and natural enemies)**

**-- 90.10. Animals (not including livestock or pests)**

*90.10.10. Amphibians*

* Amphibian abundance
* Abundance of amphibians as natural enemies of crop pests
* Amphibian diversity
* Diversity of amphibians as natural enemies of crop pests

*90.10.20. Birds*

* Bird abundance
* Abundance of birds as crop pollinators
* Abundance of birds as natural enemies of crop pests
* Bird diversity
* Diversity of birds as crop pollinators
* Diversity of birds as natural enemies of crop pests

*90.10.30. Invertebrates (including insects and other arthropods)*

* Invertebrate abundance
* Abundance of invertebrates as crop pollinators
* Abundance of invertebrates as natural enemies of crop pests
* Invertebrate diversity
* Diversity of invertebrates as crop pollinators
* Diversity of invertebrates as natural enemies of crop pests

*90.10.40. Mammals*

* Mammal abundance
* Abundance of mammals as crop pollinators
* Abundance of mammals as natural enemies of crop pests
* Mammal diversity
* Diversity of mammals as crop pollinators
* Diversity of mammals as natural enemies of crop pests

*90.10.50. Reptiles*

* Reptile abundance
* Abundance of reptiles as natural enemies of crop pests
* Reptile diversity
* Diversity of reptiles as natural enemies of crop pests

*90.10.NEC. Animals, n.e.c.*

**-- 90.20. Plants (not including crops or weeds)**

*90.20.10. Grasses*

* Grass abundance
* Grass diversity

*90.20.20. Forbs*

* Forb abundance
* Forb diversity

*90.20.30. Shrubs*

* Shrub abundance
* Shrub diversity

*90.20.40. Trees*

* Tree abundance
* Tree diversity

*90.20.NEC. Plants, n.e.c.*

**-- 90.30. Fungi (not including crops or mycorrhizae)**

*90.30.10. Mushrooms*

* Mushroom abundance
* Mushroom diversity

*90.30.NEC. Fungi, n.e.c.*