## Classification of agricultural practices to be included in the systematic map

We will use this provisional classification for coding (via drop-down menus in our data-entry forms). A secondary objective of this map is to test the usability of this classification, and we will discuss the classification itself in a future publication, if it seems useful for future systematic maps. If possible, studies will be classified at one of the levels with bullet points (“n.e.c.” = not elsewhere classified).

1. **Crop management**
   1. Selecting and preparing the planting material
      1. ***Selecting the planting material***
         1. Selecting a different type of planting material
            * *Planting a different crop (e.g., cassava vs maize)*
            * *Planting a different variety/cultivar (e.g., a disease-resistant variety)*
            * *Planting materials of a different quality (e.g., longer vs shorter cuttings, or older vs younger stored seeds)*

*Planting materials that are disease-free*

*Planting materials from a different source (e.g., cuttings from a different part of the mother plant)*

* + - * + *Planting seeds vs cuttings (i.e. sexual vs asexual propagules)*
        + *Planting a different type of planting material, n.e.c.*
    1. ***Preparing the planting material***
       1. Preparing the planting material (vs control)
          - *Cutting, scraping, or trimming before planting*
          - *Grafting*
          - *Inoculating with microorganisms before planting (e.g., biofertilizers or biological control agents)*

*Inoculating with bacteria (including rhizobacteria) before planting*

*Inoculating with fungi (including mycorrhizae) before planting*

* + - * + *Treating with heat or cold before planting (e.g., storing planting materials at different temperatures)*
        + *Treating with light or darkness before planting*
        + *Treating with chemicals or water before planting*

*Treating with desiccant before planting (e.g., drying seeds)*

*Treating with water before planting (e.g., soaking seeds or cuttings)*

*Treating with hormones before planting (e.g., rooting hormone)*

*Treating with nutrients before planting (e.g., nitrogen)*

*Treating with fungicide before planting*

*Treating with herbicide before planting*

*Treating with pesticide before planting*

* + - * + *Preparing the planting material (vs control), n.e.c.*
      1. Preparing the planting material using a different method/tool
         * *Preparing the planting material using a different method/tool, n.e.c.*
  1. Planting crops (including intercropping/polyculture/agroforestry)
     1. ***Planting crops***
        1. Planting crops (vs control; i.e. vs abandoning farmland; also see "using crop rotations" for fallows)
           + *Planting crops (vs control), n.e.c.*
        2. Planting crops using a different method/tool
           + *Planting in a different location/environment*

*Planting in a different agro-climatic context (e.g., climate type or soil type)*

*Planting in a different landscape context (e.g., near natural habitat or near a mining area)*

*Planting in a different local context (e.g., a larger field vs a smaller field)*

*Planting using an artificial structure (e.g., in a polytunnel or under a shade net)*

* + - * + *Planting at a different time (i.e. earlier vs later, but not year vs year)*
        + *Planting in a different substrate (e.g., planting in mounds, ridges, or raised beds; also see "landscaping" and "tilling")*
        + *Planting at a different density or spacing (including planting in rows vs broadcasting)*
        + *Planting at a different depth*

*Planting below the surface of the soil (e.g., using dibbing sticks or seed drills vs broadcasting)*

* + - * + *Planting in a different orientation (e.g., planting cuttings horizontally vs vertically)*
        + *Planting using machinery (e.g., vs planting using hand tools)*
        + *Planting using a different method/tool, n.e.c.*
    1. ***Intercropping/polyculture (e.g., agroforestry or companion planting)***
       1. Intercropping/polyculture (vs control; i.e. polyculture vs monoculture)
          - *Intercropping/polyculture with non-woody plants (including ground cover during the growing season; e.g., push-pull with companion plants)*
          - *Intercropping/polyculture with woody plants (agroforestry, including alley cropping and shade cropping)*
          - *Intercropping/polyculture, n.e.c.*
       2. Intercropping/polyculture using a different method/tool/species
          - *Intercropping/polyculture using a different method/tool/species, n.e.c.*
  1. Managing crop growth (also see "pathogen, pest, and weed management" and "fertilizing and irrigating")
     1. ***Thinning/pruning crops***
        1. Thinning/pruning crops (vs control)
           + *Thinning/pruning crops (vs control), n.e.c.*
        2. Thinning/pruning crops using a different method/tool
           + *Thinning/pruning crops using a different method/tool, n.e.c.*
     2. ***Supporting/training crops***
        1. Supporting/training crops (vs control)
           + *Supporting/training crops (vs control), n.e.c.*
        2. Supporting/training crops using a different method/tool
           + *Supporting/training crops using a different method/tool, n.e.c.*
     3. ***Pollinating crops (also see "providing resources for pollinators")***
        1. Pollinating crops (vs control)
           + *Pollinating crops by hand*
           + *Using managed pollinators (e.g., honey bee hives)*
           + *Pollinating crops (vs control), n.e.c.*
        2. Pollinating crops using a different method/tool
           + *Pollinating crops using a different method/tool, n.e.c.*
  2. Harvesting crops
     1. ***Harvesting crops***
        1. Harvesting crops (vs control; i.e. vs leaving crops in the field)
           + *Harvesting crops (vs control), n.e.c.*
        2. Harvesting crops using a different method/tool
           + *Harvesting crops at a different time*
           + *Harvesting crops using machinery (e.g., vs harvesting using hand tools)*

*Harvesting crops using different machines (e.g., larger, wider, heavier)*

* + - * + *Harvesting crops using a different method/tool, n.e.c.*
  1. Managing crop rotations, cover crops, and crop residues
     1. ***Managing crop residues (also see "tilling the soil")***
        1. Destroying/removing crop residues (vs control; i.e. vs retaining crop residues)
           + *Burning crop residues*
           + *Desiccating crop residues using herbicide*
           + *Removing crop residues from the field*
           + *Destroying/removing crop residues (vs control), n.e.c.*
        2. Destroying/removing crop residues using a different method/tool
           + *Destroying/removing crop residues using a different method/tool, n.e.c.*
        3. Incorporating crop residues into the soil (vs control; also see "tilling the soil")
           + *Incorporating crop residues into the soil (vs control), n.e.c.*
        4. Incorporating crop residues into the soil using a different method/tool
           + *Incorporating crop residues into the soil using a different method/tool, n.e.c.*
     2. ***Using crop rotations (including cover crops in the non-growing season; also see "intercropping/polyculture")***
        1. Using crop rotations (vs control)
           + *Rotating cash/food crops with different cash/food crops*
           + *Rotating cash/food crops with cover crops (not including intercropping in the growing season)*
           + *Rotating cash/food crops with temporary grasslands/pastures/fallows (not including cover crops)*
           + *Using crop rotations (vs control), n.e.c.*
        2. Using a different method/tool/species for crop rotations
           + *Using a different species for crop rotations (e.g., different species in planted fallows)*
           + *Using a different frequency for crop rotations (e.g., growing the main crop every two years vs every four years)*
           + *Using a different method/tool/species for crop rotations, n.e.c.*
  2. Managing crops after harvesting (post-harvest management)
     1. ***Storing crops***
        1. Storing crops (vs control; i.e. vs using crops as food, feed, fuel, etc.)
           + *Storing crops (vs control), n.e.c.*
        2. Storing crops using a different method/tool
           + *Storing crops using a different method/tool, n.e.c.*
  3. Crop management, n.e.c.

1. **Soil and land management**
   1. Preparing land for planting
      1. ***Clearing land for planting (also see "retaining semi-natural habitats")***
         1. Clearing land for planting (vs control; e.g., vs retaining semi-natural habitat)
            * *Clearing land for planting (vs control), n.e.c.*
         2. Clearing land for planting using a different method/tool (e.g., slash-and-burn vs bulldozer)
            * *Clearing land for planting using a different method/tool, n.e.c.*
      2. ***Landscaping (e.g., terracing and managing drainage)***
         1. Landscaping (vs control)
            * *Landscaping (vs control), n.e.c.*
         2. Landscaping using a different method/tool
            * *Landscaping using a different method/tool, n.e.c.*
      3. ***Tilling the soil (i.e. plowing/harrowing)***
         1. Tilling the soil (vs control; i.e. vs no tillage)
            * *Tilling the soil (vs control; i.e. vs no tillage), n.e.c.*
         2. Tilling the soil using a different method/tool
            * *Contour plowing (e.g., on slopes)*
            * *Tilling the soil less (e.g., conservation tillage/minimum tillage/reduced tillage)*

*Tilling the soil less frequently*

*Tilling the soil less deeply*

*Tilling the soil less quickly*

* + - * + *Tilling the soil more (e.g., ripping/subsoiling to reduce compaction)*

*Tilling the soil more deeply*

* + - * + *Tilling the soil using machinery (e.g., vs tilling using hand tools)*

*Tilling the soil using lightweight/small machinery*

* + - * + *Tilling the soil using a different tool (e.g., disc harrow vs moldboard plow)*
        + *Tilling the soil using a different method/tool, n.e.c.*
    1. ***Preparing the planting bed (e.g., levelling and making raised beds)***
       1. Preparing the planting bed (vs control)
          - *Making mounds, ridges, or raised beds*
          - *Making planting holes*
          - *Preparing the planting bed (vs control), n.e.c.*
       2. Preparing the planting bed using a different method/tool
          - *Preparing the planting bed using a different method/tool, n.e.c.*
  1. Fertilizing and irrigating
     1. ***Applying fertilizer and other soil amendments***
        1. Applying fertilizer and other soil amendments (vs control)
           + *Adding ash to the soil*
           + *Adding synthetic/mineral/inorganic fertilizer to the soil (including N, P, K, and other nutrients)*
           + *Adding beneficial microorganisms (biofertilizer) to the soil*

*Inoculating the soil with bacteria (including rhizobacteria)*

*Inoculating the soil with fungi (including mycorrhizae)*

* + - * + *Adding biochar to the soil*
        + *Adding compost to the soil*

*Adding composted manure*

*Adding composted municipal waste*

*Adding composted plants*

*Adding compost, n.e.c.*

* + - * + *Adding lime or another source of calcium to the soil*
        + *Adding manure to the soil*

*Adding liquid manure (slurry)*

*Adding solid manure*

* + - * + *Adding sewage sludge to the soil*
        + *Mulching (i.e. adding a layer of material to the surface of the soil; also see "managing crop residues")*

*Mulching with organic matter (e.g., straw)*

*Mulching with synthetic material (e.g., plastic)*

* + - * + *Adding nitrification inhibitor to the soil*
        + *Applying fertilizer and other soil amendments (vs control), n.e.c.*
      1. Applying fertilizer and other soil amendments using a different method/tool/material
         * *Using a different amount of the amendment/fertilizer (e.g., using the recommended rate of fertilizer)*
         * *Using a different method of applying the amendment/fertilizer*

*Applying the fertilizer in a different place (e.g., injecting vs spreading; fertilizing planting holes; using band application)*

*Applying the fertilizer at a different time (e.g., split application)*

* + - * + *Using a different type of amendment/fertilizer or mixture*

*Using a different type of synthetic/mineral/inorganic fertilizer (e.g., different N:P:K ratio; liquid vs solid)*

*Using an organic amendment vs a synthetic/mineral/inorganic amendment*

*Using a mixture of organic and inorganic amendments*

*Using a different type of organic amendment (e.g., liquid vs solid manure; different types of compost)*

* + - * + *Applying fertilizer and other soil amendments using a different method/tool/material, n.e.c.*
    1. ***Irrigating***
       1. Using irrigation (vs control; i.e. vs rainfed cropping)
          - *Using drip irrigation*
          - *Using flood irrigation*
          - *Using furrow irrigation*
          - *Using sprinkler irrigation*
          - *Using irrigation (vs control), n.e.c.*
       2. Using a different method/tool/source of irrigation water
          - *Using a different type of irrigation system*

*Using precision irrigation (e.g., vs flood/furrow irrigation)*

* + - * + *Using a different amount of irrigation water*
        + *Using a different type of irrigation water*

*Using recycled irrigation water*

* + - * + *Using a different method/tool/source of irrigation water, n.e.c.*
  1. Soil and land management, n.e.c.

1. **Pathogen, pest, and weed management (see other categories for cultural control, host plant resistance, and habitat management)**
   1. Pathogen control (e.g., bacteria, fungi, and viruses)
      1. ***Biological control of pathogens***
         1. Biological control of pathogens (vs no biological control)
            * *Introducing biological control agents for pathogens*
            * *Biological control of pathogens (vs no biological control), n.e.c.*
         2. Using a different method/tool/species for biological control of pathogens
            * *Using a different method/tool/species for biological control of pathogens, n.e.c.*
      2. ***Chemical control of pathogens***
         1. Chemical control of pathogens (vs no chemical control)
            * *Using a fungicide or mixture of fungicides*
            * *Chemical control of pathogens (vs no chemical control), n.e.c.*
         2. Using a different method/tool/chemical for chemical control of pathogens
            * *Using a different amount of fungicide*
            * *Using a different method of applying fungicide*

*Fumigating the soil*

* + - * + *Using a different type of fungicide or mixture of fungicides*
        + *Using a different method/tool/chemical for chemical control of pathogens, n.e.c.*
    1. ***Physical/mechanical control of pathogens***
       1. Physical/mechanical control of pathogens (vs no physical/mechanical control)
          - *Destroying diseased plants in the field*

*Burning diseased plants in the field*

*Burying diseased plants in the field*

* + - * + *Removing diseased plants from the field*
        + *Physical/mechanical control of pathogens (vs no physical/mechanical control), n.e.c.*
      1. Using a different method/tool for physical/mechanical control of pathogens
         * *Using a different method/tool for physical/mechanical control of pathogens, n.e.c.*
  1. Invertebrate pest control (e.g., insects and mites)
     1. ***Biological control of invertebrate pests***
        1. Biological control of invertebrate pests (vs no biological control)
           + *Introducing biological control agents for invertebrate pests (including biopesticides)*
           + *Biological control of invertebrate pests (vs no biological control), n.e.c.*
        2. Using a different method/tool/species for biological control of invertebrate pests
           + *Using a different method/tool/species for biological control of invertebrate pests, n.e.c.*
     2. ***Chemical control of invertebrate pests***
        1. Chemical control of invertebrate pests (vs no chemical control)
           + *Using a pesticide or mixture of pesticides*

*Using organic pesticide*

* + - * + *Using a chemical deterrent/repellent*
        + *Using a chemical trap/lure (e.g., pheromone traps)*
        + *Using soap and water as a spray*
        + *Chemical control of invertebrate pests (vs no chemical control), n.e.c.*
      1. Using a different method/tool/chemical for chemical control of invertebrate pests
         * *Using a different amount of chemical*
         * *Using a different method of applying chemical*
         * *Using a different type of chemical or mixture of chemicals*
         * *Using a different method/tool/chemical for chemical control of invertebrate pests, n.e.c.*
    1. ***Physical/mechanical control of invertebrate pests***
       1. Physical/mechanical control of invertebrate pests (vs no physical/mechanical control)
          - *Destroying/removing invertebrate pests by hand*
          - *Using pressurized sprays (e.g., water cannons)*
          - *Using physical/mechanical traps (e.g., sticky traps)*
          - *Excluding invertebrate pests from crops (e.g., netting or other barriers)*
          - *Physical/mechanical control of invertebrate pests (vs no physical/mechanical control), n.e.c.*
       2. Using a different method/tool for physical/mechanical control of invertebrate pests
          - *Using a different method/tool for physical/mechanical control of invertebrate pests, n.e.c.*
  1. Vertebrate pest control (e.g., birds and mammals)
     1. ***Biological control of vertebrate pests***
        1. Biological control of vertebrate pests (vs no biological control)
           + *Introducing biological control agents for vertebrate pests*
           + *Biological control of vertebrate pests (vs no biological control), n.e.c.*
        2. Using a different method/tool/species for biological control of vertebrate pests
           + *Using a different method/tool/species for biological control of vertebrate pests, n.e.c.*
     2. ***Chemical control of vertebrate pests***
        1. Chemical control of vertebrate pests (vs no chemical control)
           + *Using a poison or mixture of poisons*
           + *Using a chemical deterrent/repellent*
           + *Chemical control of vertebrate pests (vs no chemical control), n.e.c.*
        2. Using a different method/tool/chemical for chemical control of vertebrate pests
           + *Using a different amount of the chemical*
           + *Using a different method of applying the chemical*
           + *Using a different type of chemical or mixture of chemicals*
           + *Using a different method/tool/chemical for chemical control of vertebrate pests, n.e.c.*
     3. ***Physical/mechanical control of vertebrate pests***
        1. Physical/mechanical control of vertebrate pests (vs no physical/mechanical control)
           + *Excluding vertebrate pests from crops (e.g., netting or fencing)*

*Fencing crops*

*Netting crops*

* + - * + *Repelling vertebrate pests from crops*

*Guarding crops*

*Using bird scarers or other bird deterrents*

* + - * + *Physical/mechanical control of vertebrate pests (vs no physical/mechanical control), n.e.c.*
      1. Using a different method/tool for physical/mechanical control of vertebrate pests
         * *Using a different method/tool for physical/mechanical control of vertebrate pests, n.e.c.*
  1. Weed control
     1. ***Biological control of weeds***
        1. Biological control of weeds (vs no biological control)
           + *Introducing biological control agents for weeds (including bioherbicides)*
           + *Biological control of weeds (vs no biological control), n.e.c.*
        2. Using a different method/tool/species for biological control of weeds
           + *Using a different method/tool/species for biological control of weeds, n.e.c.*
     2. ***Chemical control of weeds***
        1. Chemical control of weeds (vs no chemical control)
           + *Using a herbicide or mixture of herbicides*
           + *Chemical control of weeds (vs no chemical control), n.e.c.*
        2. Using a different method/tool/chemical for chemical control of weeds
           + *Using a different amount of herbicide*
           + *Using a different method of applying herbicide*
           + *Using a different type of herbicide or mixture of herbicides*
           + *Using a different method/tool/chemical for chemical control of weeds, n.e.c.*
     3. ***Physical/mechanical control of weeds (also see "soil" for "tilling" and "mulching")***
        1. Physical/mechanical control of weeds (vs no physical/mechanical control)
           + *Cultivating (i.e. disturbing the surface of the soil to destroy weeds)*
           + *Mowing (i.e. cutting down weeds)*
           + *Weeding (i.e. uprooting weeds by hand)*
           + *Physical/mechanical control of weeds (vs no physical/mechanical control), n.e.c.*
        2. Using a different method/tool for physical/mechanical control of weeds
           + *Cultivating using machines (e.g., vs cultivating using hand tools)*
           + *Using a different method/tool for physical/mechanical control of weeds, n.e.c.*
  2. Pathogen, pest, and weed management, n.e.c.

1. **Non-crop habitat management in farmland**
   1. Grazing in non-crop habitats
      1. ***Excluding grazers from non-crop habitats***
         1. Excluding grazers from non-crop habitats (vs control)
            * *Fencing*
            * *Excluding grazers from non-crop habitats (vs control), n.e.c.*
         2. Excluding grazers from non-crop habitats using a different method/tool
            * *Excluding grazers from non-crop habitats using a different method/tool, n.e.c.*
      2. ***Using grazers to manage non-crop habitats (i.e. introducing grazers)***
         1. Using grazers to manage non-crop habitats (vs control)
            * *Using grazers to manage non-crop habitats (vs control), n.e.c.*
         2. Using grazers to manage non-crop habitats using a different method/tool/species
            * *Using a different type of grazer in non-crop habitats (e.g., traditional breeds)*
            * *Using fewer grazers in non-crop habitats (i.e. lower stocking rates)*
            * *Using less intensive grazing in non-crop habitats (e.g., seasonal grazing vs continuous grazing)*
            * *Using grazers to manage non-crop habitats using a different method/tool/species, n.e.c.*
   2. Mowing in non-crop habitats
      1. ***Mowing in non-crop habitats***
         1. Mowing in non-crop habitats (vs control)
            * *Mowing in non-crop habitats (vs control), n.e.c.*
         2. Mowing in non-crop habitats using a different method/tool
            * *Mowing at a different time or with a different frequency*
            * *Mowing closer to the ground*
            * *Mowing using machines (e.g., vs mowing using hand tools)*
            * *Mowing in non-crop habitats using a different method/tool, n.e.c.*
   3. Planting non-crop species (e.g., buffer strips, flower strips, and hedgerows)
      1. ***Planting in field margins or terrace edges (also see "intercropping/polyculture")***
         1. Planting in field margins or terrace edges (vs control)
            * *Planting buffer strips/contour strips (i.e. to reduce runoff/erosion)*
            * *Planting flower strips (non-woody vegetation; i.e. as resources for wildlife)*
            * *Planting hedgerows/shelterbelts/windbreaks (woody vegetation)*
            * *Planting in field margins or terrace edges (vs control), n.e.c.*
         2. Planting in field margins or terrace edges using a different method/tool/species
            * *Planting in field margins or terrace edges using a different method/tool/species, n.e.c.*
      2. ***Planting in other non-crop habitats in farmland (e.g., riparian areas)***
         1. Planting in other non-crop habitats (vs control)
            * *Planting in other non-crop habitats (vs control), n.e.c.*
         2. Planting in other non-crop habitats using a different method/tool/species
            * *Planting in other non-crop habitats using a different method/tool/species, n.e.c.*
   4. Providing resources for pollinators, natural pest-control species, and other wildlife
      1. ***Providing food for wildlife (also see "planting flower strips")***
         1. Providing food for wildlife (vs control)
            * *Providing artificial honeydew (e.g., for hover flies)*
            * *Providing food for wildlife (vs control), n.e.c.*
         2. Providing food for wildlife using a different method/tool/food
            * *Providing food for wildlife using a different method/tool/food, n.e.c.*
      2. ***Providing structures/features for wildlife***
         1. Providing structures/features for wildlife (vs control)
            * *Providing perches (e.g., for birds)*
            * *Providing cavities (e.g., nest boxes)*

*Providing bird boxes*

*Providing bat boxes*

*Providing nesting boards for bees*

* + - * + *Providing soil features for wildlife (e.g., beetle banks)*

*Providing bare soil (e.g., for ground-nesting bees)*

*Providing beetle banks*

* + - * + *Providing water features for wildlife (e.g., ponds)*
        + *Providing structures/features for wildlife (vs control), n.e.c.*
      1. Providing structures/features for wildlife using a different method/tool/material
         * *Providing structures for wildlife using a different method/tool/structure, n.e.c.*
  1. Retaining non-crop habitats in farmland
     1. ***Retaining artificial habitats in farmland (e.g., old buildings or walls)***
        1. Retaining artificial habitats in farmland (vs control; e.g., vs destroying habitats)
           + *Retaining artificial habitats in farmland (vs control), n.e.c.*
        2. Retaining artificial habitats in farmland using a different method/tool
           + *Retaining artificial habitats in farmland using a different method/tool, n.e.c.*
     2. ***Retaining semi-natural habitats in farmland (e.g., forest fragments or riparian areas)***
        1. Retaining semi-natural habitats in farmland (vs control; e.g., vs clearing land for planting)
           + *Retaining semi-natural habitats in farmland (vs control), n.e.c.*
        2. Retaining semi-natural habitats in farmland using a different method/tool
           + *Retaining semi-natural habitats in farmland using a different method/tool, n.e.c.*
  2. Restoring non-crop habitats in farmland (also see "landscaping", "planting in non-crop habitats", etc.)
     1. ***Restoring artificial habitats in farmland (e.g., old buildings or walls)***
        1. Restoring artificial habitats in farmland (vs control)
           + *Restoring artificial habitats in farmland (vs control), n.e.c.*
        2. Restoring artificial habitats in farmland using a different method/tool/material
           + *Restoring artificial habitats in farmland using a different method/tool/material, n.e.c.*
     2. ***Restoring semi-natural habitats in farmland (e.g., forest fragments or riparian areas)***
        1. Restoring semi-natural habitats in farmland (vs control)
           + *Restoring semi-natural habitats in farmland (vs control), n.e.c.*
        2. Restoring semi-natural habitats in farmland using a different method/tool/species
           + *Restoring semi-natural habitats in farmland using a different method/tool/species, n.e.c.*
  3. Non-crop habitat management, n.e.c.