Supplementary Table 1. Links between the EBV framework and Digital Agriculture. Table describing how Digital Agriculture enables Essential Biodiversity Variables (EBVs) included in GEO BON's EBV framework. Each row describes a single EBV, distinguishing its thematic group, name, and description. (given by the columns "Group", "Name", and "Description", respectively). In addition, information is provided on how each EBV is contributes to agroecosystems (column "Relevance for agriculture"), as well enabling data and technologies (column "Potential DA data sources (incl. technologies, sensors, and variables)") used in the scope of Digital Agriculture.

Group	Name	Description	Relevance for agriculture	Potential DA data sources (incl. technologies, sensors, and variables)
Genetic composition	Genetic diversity	Differences in DNA sequences among individuals within a single species	Identifies adaptive potential and resilience of crop and livestock populations'; informs breeding and phenotyping	Genomic sequencing, eDNA metabarcoding
	Genetic differentiation	Variation in allele identity and frequency distinguishing populations of the same species	Guides management of both cultivated and wild populations to maintain diversity	Spatially referenced genotyping
	Effective population size	size of an idealized population that would lose genetic diversity at the same rate as the real population	Indicates vulnerability to genetic drift or loss of diversity, supports long-term sustainability of crop/animal populations.	Genomic sampling over time, census proxies from drone/satellite counts
	Inbreeding	Reproduction between genetically-related individuals	Detects potential fitness loss and informs breeding programs to sustain population vitality	Genotyping
Species populations	Species distributions	Probability of a species occurring across space and time	Identifies key areas for conservation or pest control, enables integration with farm-level data for biodiversity-yield assessments	Drone imagery, GPS field surveys, citizen science apps
	Species abundances	Estimated number of individuals of a species occurring across space and time	Tracks population trends, enables early detection of pest outbreaks or declines in beneficial species; supports farmland biodiversity indicators (e.g. Farmland Bird Index)	Data from drone, camera trap, or acoustic sensors sourced by models deriving species counts.
Community composition	Community abundance	Total number of individuals across all species within ecological assemblages	Indicates community-level productivity and ecosystem health	Camera traps, drone imagery, weeding robots
	Taxonomic diversity	Diversity and identity of species within ecological assemblages	Identifies beneficial or harmful species within agricultural landscapes	
	Phylogenetic diversity	Evolutionary relationships and distinct lineages represented within ecological assemblages	Highlights evolutionary uniqueness and resilience of communities	
	Trait diversity	Range of functional traits expressed by organisms	Indicates the potential for ecosystem services such as	

		within ecological assemblages	pollination and nutrient cycling	
	Interaction diversity	Diversity and structure of interactions among organisms across trophic levels	Provides insights into ecological networks supporting pollination, pest and weed regulation, and soil quality	
Ecosystem functioning	Primary productivity	Rate at which energy is converted into organic matter through photosynthesis	Provides information on crop biomass and yield	NDVI/EVI time series from drone imagery
	Ecosystem phenology	Timing, duration, and intensity of cyclical ecological processes	Informs planting, harvesting, and monitoring of biodiversity-yield interactions	Drone imagery, phenocams
	Ecosystem disturbances	Sudden disruptions in ecosystem functioning that deviate from regular dynamics	Supports adaptive management against sudden changes (e.g., drought, pests)	Change detection from drone imagery
Ecosystem structure	Live cover fraction	Proportion of ground or substrate area occupied by living vegetation	Informs on the fractional cover of crops	Drone imagery
	Ecosystem distribution	Spatial distribution of discrete ecosystem units	Maps crop types, crop diversity, semi-natural landscape features and field size distribution	Land cover maps from satellite/drone imagery
	Ecosystem Vertical Profile	Vertical distribution (above and below the land surface) of biomass in ecosystems	Supports carbon assessment and soil quality monitoring, detects crop anomalies, e.g. in height structure	Drone imagery

Supplementary Data 1. Digital Agriculture data streams. Data used to construct **Figure 3** of the main manuscript. Each Digital Agriculture application described in Section 2 of the main manuscript (column "source"), an Essential Biodiversity Variable (EBV) is given (column "target"), which can be supported by data generated by the source. Each EBV is then connected to a larger thematic group (column "target category") as per GEO BON's EBV framework.

Supplementary Data 2. Global Digital Agriculture Initiatives. Data used to construct each panel of Figure 4, which depicts the global distribution of Digital Agriculture initiatives per continent and country. The data was sourced from the AgriTech Observatory (https://agritechobservatory.fao.org/).