The TRY Plant Trait Database - enhanced coverage and open access

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Plant traits – the morphological, anatomical, physiological, biochemical and phenological characteristics of plants – determine how plants respond to environmental factors, affect other trophic levels, and influence ecosystems properties and derived benefits and detriments to people. Plant trait data thus represent the essential basis for a vast area of research spanning evolutionary biology, community and functional ecology, biodiversity conservation, ecosystem and landscape management and restoration, biogeography to earth system modeling. Since its foundation in 2007, the TRY database of plant traits has grown continuously. It now provides unprecedented data coverage under an open access data policy and is the main plant trait database used by the research community. Increasingly the TRY database also supports new frontiers of trait-based research, including identification of data gaps and subsequent mobilization or measurement of new data. To support this development, in this article we take stock of trait data compiled in TRY and analyze emerging patterns of data coverage, representativeness, and gaps. Best species coverage is achieved for categorical traits (stable within species) relevant to determine plant functional types commonly used in global vegetation models. For the trait ‘plant growth form’ complete species coverage is within reach. However, most traits relevant for ecology and vegetation modeling are characterized by intraspecific variation and trait-environmental relationships. These traits have to be measured on individual plants in their respective environment: completeness at global scale is impossible and representativeness challenging. Due to the sheer amount of data in the TRY database, machine learning for trait prediction is promising - but does not add new data. We therefore conclude that reducing data gaps and biases by further and more systematic mobilization of trait data and new in-situ trait measurements must continue to be a high priority. This can only be achieved by a community effort in collaboration with other initiatives.