Table S1. Substrate types used in this study and how these were distinguished. Macrofungal fruiting substrate types were divided into four major categories (Litter, Root, Soil and Rare). Subgroups of these four substrates were further subdivided into 15 types; Fungal ecology types (ECT) had four sub-types types: Saprophytic (SAC) macrofungi that decompose substrate to obtain nutrients, Parasitic (PAC) macrofungi that obtain nutrients directly from the host, Biological symbiotic (BYC) macrofungi that obtain nutrients from a mutually beneficial symbiotic system, and Ectomycorrhizal (ECM) macrofungi that obtain nutrients from the tree roots. For each substrate and subgroup, definitions are listed based on identification methods and substrate characteristics.

Fruiting Substrate	Subgroup	Fungal ECT	Substrate/Subgroup Definitions: Identification Methods and Characteristics
Litter	Branch wood (BW)	SAC	A woody substrate having a length greater than 10 cm, usually an isolated branch of a large woody plant that retains its original shape. There are usually more sub-branches.
Litter	Dead leaf (DL)	SAC	The most common litter in the forest. Consists of plant leaves. Usually piles up on the ground. It is easy to find fungal fruiting bodies and hyphae on the leaves.
Litter	Fruit (FT)	SAC	Fallen fruit. This type of substrate is scarcer, but it is very easy to identify this type because saprophytic fungi usually develop within a single fruit, and mycelium are restricted to grow within the fruit.
Litter	Log wood (LW)	SAC	The most common large litter substrate. In the forest, large logs are very conspicuous and easily identified. The diameter of log wood exceeds 10 cm, and the fungal fruiting bodies and hyphae are very obvious on the logs.
Litter	Rotten leaf (RL)	SAC	The decaying leaves usually contain higher moisture and are not as sharp as the normal leaf litter. The mycelium of a few fungi will choose to grow these protoplasts.
Litter	Tree wood (TW)	SAC	The woody base of living tall woody plants. A few large wood-rot-fungi fruiting bodies can be found on live tall woody plants. Some of the substrate needs to be destroyed during the observation process to determine whether the hyphae invade the wood.
Litter	Twig (TG)	SAC	Small litter from small branches of plants, with many petiole parts. Usually less than 10 cm in length, with few fungi growing on this substrate. Because hyphae and fruiting bodies limit growth on very small substrates, these substrate types are also very easy to identify.
Rare	Dung (DG)	SAC	Generally, the feces of large herbivores, such as cattle and yak. Saprophytic fungi grow on the feces and are easily identified.
Rare	Fungal fruiting body (FB)	PAC	The substrate of a few parasitic fungi that are also the fruiting bodies of other macrofungi. This can be clearly observed.
Rare	Insect (IT)	PAC	A typical parasitic fungal substrate. The body of an insect is usually closely associated with a fungal fruiting body that is filled with hyphae.
Rare	Lichen (LN)	BYC	The fruiting body of a special macrofungus; lichens

			constitute a symbiosis between algae and fungi. Some macrofungal substrates are symbioses with lichens.
Rare	Termite-Nest (TN)	BYC	This special symbiotic substrate is only found in the symbiotic system of *Termitomyces* and termites. It arises on most active termite colonies to provide fungal fruiting. To observe, it is necessary to excavate the soil at the base of the fungal fruiting body down to the depth of the part that connects to the base of the mushrooms.
Root	Root (RT)	ECM	The root of the fungal host plant is the only substrate of the ectomycorrhizal fungus. This is also the substrate with the largest number of records, and is the most difficult substrate to identify. Fungal species classification information can be used when observing the roots. Some obvious ectomycorrhizal taxa can be recorded as root fungi, but in field experiments it is important to dig into the soil at the base of the fungal fruiting body to see if the hyphae are connected to the roots. It is also important to determine the type of substrate, which is where some hyphae are connected to the fruiting body. A root sample should be taken back to the laboratory so the mycorrhizal structure can be determined under a microscope.
Soil	Mineral soil (MS)	SAC	The soil substrate is pure soil that does not contain other substances. Usually, after excavating the base of the fungal fruiting body, the hyphae of some fungi are connected to the soil. This distinguishes them from other substrates, such as belowground logs and roots.
Soil	Organic soil (OS)	SAC	Humus soil, for which the color and traits are usually clearly distinguishable from mineral soil. It usually arises from the decomposition of soil particles rather than litter humus. A few fungi can be observed to grow on OS under the fungal fruiting body. Hyphae can be clearly seen in this type of substrate.

Note: Our survey data was based on macrofungal taxonomy and field observation records. Taxonomic information about the macrofungal species to which the fruiting body belongs (following literature such as: [1]) in combination with detailed field observations (as shown above) allowed for the type of substrate occupied by the fungi to be determined. Litter mainly consists of fallen leaves and wood; this substrate and their fungal decomposer communities are always closely related to lignin [2–4]. In forests, wood substrate is defined as woody tissues exceeding 10 cm in length, including large branches, logs, standing dead trees, some woody necromass that has become humus [5,6] and small plant tissues that are classified as litter, such as leaves or twigs [7,8–10,4]. Rare substrates are divided into several special ecological types and contain insect parasitic fungi [11–13] and symbiotic fungi [14,15], for which their host and symbiotic organisms are their substrates. Root is a substrate that is mainly derived from the recorded ecological types of macrofungal taxa [1]. The root substrates of the ectomycorrhizal fungi all belong to this substrate. Some specimens have also been subjected to observations via field excavation and laboratory microscopy [16]. Soil is classified by fungal species information and observation [1] and can be identified with the greatest degree of certainty.

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