= Tuber oregonense =

Tuber oregonense , commonly known as the Oregon white truffle , is a species of edible truffle in the genus Tuber . Described as new to science in 2010 , the North American species is found on the western coast of the United States , from northern California to southern British Columbia west of the Cascade Range . A mycorrhizal fungus , it grows in a symbiotic association with Douglas fir . It overlaps in distribution with the closely related T. gibbosum , but they have different growing seasons : T. oregonense typically appears from October through March , while T. gibbosum grows from January to June . The fruit bodies of the fungus are roughly spherical to irregular in shape , and resemble small potatoes up to 5 cm (2 in) in diameter . Inside the truffle is the gleba , which is initially white before it becomes a marbled tan color . The large , often thick @-@ walled , and strongly ornamented spores are produced in large spherical asci . The truffle is highly prized for its taste and aroma . Some individuals have claimed success in cultivating the truffles in Christmas tree farms .

= = Taxonomy and phylogeny = =

The species was first officially described and named in a 2010 Mycologia article , although Tuber oregonense had been previously used provisionally (as Tuber oregonense Trappe & Bonito) in American field guides and other popular publications for several years . The type specimen was collected from Benton County , Oregon on 3 February , 2007 along U.S. Route 20 in Oregon .

The specific epithet oregonense derives from the name Oregon and the Latin suffix -ense (relating to) , in reference to western Oregon being its central region of abundance . The fungus is commonly known as the Oregon white truffle . Truffle authority James Trappe initially intended to name the species as a variety of Tuber gibbosum (i.e. , as Tuber gibbosum var. oregonense) before molecular analysis revealed that genetic differences warranted distinction at the species level .

Tuber oregonense is part of the Gibbosum clade of the genus Tuber , which contains species that have " peculiar wall thickenings on hyphal tips emerging from the peridial surface at maturity . "

= = Description = =

The fruit bodies of T. oregonense are hypogeous (growing in the ground) , typically 0 @.@ 5 ? 5 cm (0 @.@ 2 ? 2 in) broad , although specimens up to 7 @.@ 5 cm (3 @.@ 0 in) have been recorded . Smaller specimens are spherical or nearly so , and have random furrows ; larger specimens are more irregular in shape , lobed and deeply furrowed . Young fruit bodies have a white peridium , as the truffle matures it develops red to reddish @-@ brown or orangish @-@ brown patches ; with age it becomes orange @-@ brown to reddish @-@ brown overall and often develops cracks on the surface . The peridium is 0 @.@ 2 ? 0 @.@ 4 mm thick , and the surface texture ranges from relatively smooth to covered with tiny " hairs " that are more dense in the furrows , and more scattered on the exposed lobes . The gleba is solid , in youth the fertile tissue is whitish and marbled with mostly narrow , white , hypha @-@ stuffed veins that emerge throughout the peridium to its surface . In maturity , the fertile tissue is light brown to brown from the color of the spores , but the marbling veins remain white . The odor and flavor of the flesh are mild in youth , but soon become strong , pungent and complex , or " truffly " .

The spores are ellipsoid to somewhat spindle @-@ shaped with narrowed ends , and light brownish in color . The size of the spores varies depending upon the type of asci in which they develop : in one @-@ spored asci they measure 42 @.@ 5 ? 62 @.@ 5 by 17 @.@ 5 ? 30 µm ; in two @-@ spored asci they are 32 @.@ 5 ? 50 by 15 ? 25 µm ; in three @-@ spored asci they are 27 @.@ 5 ? 45 by 15 ? 25 µm ; in four @-@ spored asci they are 25 ? 38 @.@ 5 by 13 ? 28 µm ; in five @-@ spored asci 28 ? 34 by 22 ? 25 µm (all sizes excluding surface ornamentation) . The spore walls are 2 ? 3 µm thick and are covered with a honeycomb @-@ like (alveolate) network . The cavities of the honeycomb typically have five or six sides , and the corners form spines that are 5 ? 7 µm tall

by 0 @.@ 5 µm thick . A " microreticulum " appears in some spores when the light microscope objective is focused on the optical cross section but not on the spore wall surface , or on scanning electron microscopy micrographs of the surface . Young asci range in shape from spherical to broadly ellipsoid to ovoid (egg @-@ shaped) or pyriform (pear @-@ shaped) ; sometimes the base of the ascus is narrowed like a stipe , and measures up to 15 by 7 µm . Mature asci are spherical to broadly ellipsoid or misshapen from the pressure of crowded spores within . They are hyaline (translucent) , thin @-@ walled , 60 ? 85 by 65 ? 75 µm , 1 ? 4- (occasionally 5) -spored , and astipitate (without a stipe) at maturity .

The peridiopellis (the cuticle of the peridium) is 200 ? 300 µm thick plus or minus 80 µm of tightly interwoven hyphae that are 3 ? 5 (sometimes up to 10) µm broad . The cells are short and have nearly hyaline walls that measure 0 @.@ 5 ? 1 µm thick ; the interior veins emerge through the peridium the cells and often form a localized tissue of rounded cells up to 12 µm broad . The degree to which the surface is covered with fine " hairs " is variable ; these hairs are made of tangled hyphae and emergent thin @-@ walled hyphal tips 2 ? 5 µm in diameter , some even and smooth , some with granulated surfaces and some with moniliform walls (resembling a string of beads) that are irregularly thickened by hyaline bands that are 0 @.@ 5 ? 2 µm wide . The subpellis (the tissue layer immediately under the pellis) is abruptly differentiated from the pellis , 150 ? 220 µm thick , and comprises interwoven , nearly hyaline , thin @-@ walled hyphae 2 ? 10 µm wide with scattered cells up to 15 µm wide . The gleba is made of hyaline , thin @-@ walled , interwoven hyphae that are 2 ? 7 µm broad with scattered cells that are inflated up to 15 µm .

= = = Similar species = = =

Tuber oregonense closely resembles Tuber gibbosum , which grows in the same habitats , but may be distinguished by the structure of its peridium , and differences in spores size and shape . Further , Tuber gibbosum grows from January to June .

= = = Edibility = = =

Tuber oregonense is a choice edible species . Its odor has been described as " " truffly " , a complex of garlic , spices , cheese , and " indefinable other essences " ; the fungus is prized after by commercial truffle harvesters and consumers for its intense fragrance . Because they grow in the topsoil and needles , they are considered to have a more " floral " and " herbal " flavor profile than related European truffles . Some individuals have claimed to have had success in growing the truffles in Christmas tree farms in Oregon . Techniques reportedly involve inoculating the ground under young Douglas fir trees with a slurry comprising ground @-@ up truffles mixed in water , or the feces of animals fed truffles . There is , however , no concrete evidence that these methods can be used to establish new truffle patches or to improve the productivity of existing patches .

= = Ecology , habitat and distribution = =

Like all Tuber species , T. oregonense is mycorrhizal . The fungus grows west of the Cascade Mountains from the southern Puget Sound region of Washington , south to southwestern Oregon at elevations from near sea level up to 425 m (1 @,@ 390 ft) in pure stands of Pseudotsuga menziesii forests up to 100 years old , or Pseudotsuga mixed with Tsuga heterophylla , Picea sitchensis or Alnus species . The species has been commercially harvested in the Pacific Northwest since the 1980s. and is often found in Christmas tree plantations as young as five years . The Oregon Truffle Festival , held in Eugene yearly since 2006 to coincide with the maturing of the truffle in late January , features activities such as cultivation seminars and truffle hunting excursions . Fruit bodies are produced from September through the middle of March . The fungus is an important component of the diet of Northern flying squirrels , and comprises the majority of their diet at certain times of the year .