

Literature

- references

Müller WR, Rauscher T, Agerer R, Chevalier G (1996) *Tuber uncinatum* Chat.+ *Corylus avellana* L. Descr Ectomyc 1: 179-183.

Morphology

Morphology of the mycorrhizal system

- length

0 mm Lower value of unspecified range (could be μ -s.d., but not known)

6 mm Upper value of unspecified range (could be μ +s.d., but not known)

- ramification presence-type

monopodial-pyramidal [very irregularly ramified]

- ramification orders

0 Lower value of unspecified range (could be μ -s.d., but not known)

1 Upper value of unspecified range (could be μ +s.d., but not known)

2 Maximum value

- main axis diameter

0.3 mm Lower value of unspecified range (could be μ -s.d., but not known)

0.39 mm Upper value of unspecified range (could be μ +s.d., but not known)

- rhizomorphs as stout, short, conical structures presence-abundance

absent

- rhizomorphs as short mycorrhiza-like outgrowths with blunt tips presence

absent

- rhizomorphs presence

absent

- exploration type

short distance

Morphology of the unramified ends

- shape

straight

- shape { of distal end }

not inflated, cylindric

- length

0 mm Lower value of unspecified range (could be μ -s.d., but not known)

2.6 mm Upper value of unspecified range (could be μ +s.d., but not known)

3 mm Maximum value

- diameter

0.3 mm Mean (= average)

- colour

brown

or red

- very tip colour
 - brown
 - or ochre, yellowish brown
- older parts colour
 - dark brown
 - or brown
- mantle cortical cells visibility
 - not visible
- mantle { distinct } surface visibility
 - present
- mantle transparency
 - not transparent
- mantle laticifers visibility
 - absent
- mantle dots presence-colour
 - absent
- mantle carbonizing presence
 - absent
- mantle surface { in detail } kind
 - densely short-spiny
- emanating hyphae presence
 - absent
 - or present
- emanating hyphae abundance
 - infrequent

Morphology of sclerotia

- presence
 - absent

Anatomy

Anatomical features of the entire mycorrhiza

- emanating elements presence-type
 - cystidia
- emanating elements cystidia location
 - on outer mantle layer

Anatomy of laticifers

- presence
 - absent

Anatomical features of the mantle

- matrix presence
absent

Anatomy of the outer mantle layer apart from the ectormycorrhizal tip

- organisation
plectenchymatous
and pseudoparenchymatous
- organisation { if pseudoparenchymatous } cell shape
angular
- mantle type
angular cells (type L)
- pores between cells presence
absent
- septa clamps presence
absent
- cell pigment location-colour
membranaceously brownish
- cell contents presence-kind
absent
- cell diameter
 - 3 μm Minimum value
 - 5 μm Lower value of unspecified range (could be $\mu\text{-s.d.}$, but not known)
 - 8 μm Upper value of unspecified range (could be $\mu\text{+s.d.}$, but not known)
 - 10 μm Maximum value
- cell length
 - 6 μm Minimum value
 - 8 μm Lower value of unspecified range (could be $\mu\text{-s.d.}$, but not known)
 - 13 μm Upper value of unspecified range (could be $\mu\text{+s.d.}$, but not known)
 - 15 μm Maximum value
- cell density
 - 10 Lower value of unspecified range (could be $\mu\text{-s.d.}$, but not known)
 - 12 Upper value of unspecified range (could be $\mu\text{+s.d.}$, but not known)
- cell wall thickness
 - 0.5 μm Lower value of unspecified range (could be $\mu\text{-s.d.}$, but not known)
 - 2 μm Upper value of unspecified range (could be $\mu\text{+s.d.}$, but not known)
- cell wall with globular thickenings
absent
- cell wall surface habit
smooth
- cell wall projections presence
present
- cell wall projections abundance
infrequent

- cell wall projections shape
even in thickness
- drops of exuded pigment presence
absent

Anatomy of the middle mantle layer

- organisation
pseudoparenchymatous
- cell pigment location-colour
membranaceously brownish
- cell diameter
 - 4 μm Lower value of unspecified range (could be $\mu\text{-s.d.}$, but not known)
 - 10 μm Upper value of unspecified range (could be $\mu\text{+s.d.}$, but not known)
 - 13 μm Maximum value
- cell length
 - 6 μm Minimum value
 - 8 μm Lower value of unspecified range (could be $\mu\text{-s.d.}$, but not known)
 - 15 μm Upper value of unspecified range (could be $\mu\text{+s.d.}$, but not known)
 - 18 μm Maximum value
- cell density
 - 6 Minimum value
 - 9 Lower value of unspecified range (could be $\mu\text{-s.d.}$, but not known)
 - 11 Upper value of unspecified range (could be $\mu\text{+s.d.}$, but not known)
- cell contents presence-kind
absent
- cell wall thickness
 - 0.5 μm Lower value of unspecified range (could be $\mu\text{-s.d.}$, but not known)
 - 1.5 μm Upper value of unspecified range (could be $\mu\text{+s.d.}$, but not known)
- cell wall surface habit
smooth

Anatomy of the inner mantle layer

- organisation
pseudoparenchymatous
- cell pigment location-colour
membranaceously brownish
- cell diameter
 - 3 μm Minimum value
 - 5 μm Lower value of unspecified range (could be $\mu\text{-s.d.}$, but not known)
 - 8 μm Upper value of unspecified range (could be $\mu\text{+s.d.}$, but not known)
 - 10 μm Maximum value
- cell length
 - 7 μm Minimum value
 - 10 μm Lower value of unspecified range (could be $\mu\text{-s.d.}$, but not known)
 - 14 μm Upper value of unspecified range (could be $\mu\text{+s.d.}$, but not known)

16 μm Maximum value

- cell contents presence-kind
absent

Anatomy of the outer mantle layer of the ectomycorrhizal tip

- anatomy mantle outer mantle layer { of ectomycorrhizal tip } organisation
pseudoparenchymatous
- anatomy mantle outer mantle layer { of ectomycorrhizal tip } hyphae diameter
 - 2 μm Minimum value
 - 3 μm Lower value of unspecified range (could be $\mu\text{-s.d.}$, but not known)
 - 6 μm Upper value of unspecified range (could be $\mu\text{+s.d.}$, but not known)
 - 7 μm Maximum value
- anatomy mantle outer mantle layer { of ectomycorrhizal tip } cell density
 - 14 Lower value of unspecified range (could be $\mu\text{-s.d.}$, but not known)
 - 16 Upper value of unspecified range (could be $\mu\text{+s.d.}$, but not known)

Anatomy of the mantle in longitudinal section

- mantle thickness { apart from tip }
 - 15 μm Minimum value
 - 20 μm Lower value of unspecified range (could be $\mu\text{-s.d.}$, but not known)
 - 25 μm Upper value of unspecified range (could be $\mu\text{+s.d.}$, but not known)
 - 30 μm Maximum value
- mantle thickness { at ectomycorrhizal tip }
 - 5 μm Minimum value
 - 10 μm Lower value of unspecified range (could be $\mu\text{-s.d.}$, but not known)
 - 15 μm Upper value of unspecified range (could be $\mu\text{+s.d.}$, but not known)
 - 20 μm Maximum value
- middle mantle layer hyphae tangentially length
 - 5 μm Minimum value
 - 8 μm Lower value of unspecified range (could be $\mu\text{-s.d.}$, but not known)
 - 15 μm Upper value of unspecified range (could be $\mu\text{+s.d.}$, but not known)
 - 20 μm Maximum value

Anatomy of the tannin cells in longitudinal section

- presence
absent

Anatomy of the cortical cells in longitudinal section

- anatomy mantle longitudinal section cortical (epidermal) cells shape
radially-oval to -elliptic, oriented obliquely
- anatomy mantle longitudinal section cortical (epidermal) cells tangentially length
 - 6 μm Lower value of unspecified range (could be $\mu\text{-s.d.}$, but not known)
 - 17 μm Upper value of unspecified range (could be $\mu\text{+s.d.}$, but not known)

- anatomy mantle longitudinal section cortical (epidermal) cells radially diameter
 - 23 μm Minimum value
 - 28 μm Lower value of unspecified range (could be $\mu\text{-s.d.}$, but not known)
 - 53 μm Upper value of unspecified range (could be $\mu\text{+s.d.}$, but not known)
 - 60 μm Maximum value

Anatomy of the Hartig net in longitudinal section

- presence
 - present
- kind
 - paraepidermal
- structure {in plan view}
 - of palmetti type
- lobes width
 - 1 μm Minimum value
 - 1.5 μm Lower value of unspecified range (could be $\mu\text{-s.d.}$, but not known)
 - 2.5 μm Upper value of unspecified range (could be $\mu\text{+s.d.}$, but not known)
 - 3 μm Maximum value

Anatomy of the mantle in cross-section

- mantle different layers presence
 - discernible
- outer mantle layer organisation
 - pseudoparenchymatous
- outer mantle layer hyphae tangentially length
 - 5 μm Lower value of unspecified range (could be $\mu\text{-s.d.}$, but not known)
 - 10 μm Upper value of unspecified range (could be $\mu\text{+s.d.}$, but not known)
 - 15 μm Maximum value
- outer mantle layer hyphae radially diameter
 - 2 μm Lower value of unspecified range (could be $\mu\text{-s.d.}$, but not known)
 - 3 μm Upper value of unspecified range (could be $\mu\text{+s.d.}$, but not known)
 - 4 μm Maximum value
- middle mantle layer organisation
 - pseudoparenchymatous
- middle mantle layer hyphae tangentially length
 - 3 μm Minimum value
 - 5 μm Lower value of unspecified range (could be $\mu\text{-s.d.}$, but not known)
 - 12 μm Upper value of unspecified range (could be $\mu\text{+s.d.}$, but not known)
- middle mantle layer hyphae radially diameter
 - 3 μm Lower value of unspecified range (could be $\mu\text{-s.d.}$, but not known)
 - 5 μm Upper value of unspecified range (could be $\mu\text{+s.d.}$, but not known)
 - 7 μm Maximum value
- inner mantle layer organisation
 - pseudoparenchymatous

- inner mantle layer hyphae tangentially length
 - 3 μm Lower value of unspecified range (could be $\mu\text{-s.d.}$, but not known)
 - 5 μm Upper value of unspecified range (could be $\mu\text{+s.d.}$, but not known)
 - 10 μm Maximum value

Anatomy of the tannin cells in cross-section

- presence
 - absent

Anatomy of the cortical cells in cross-section

- anatomy mantle cross-section cortical (epidermal) cells shape
 - radially-oval to -elliptic
- anatomy mantle cross-section cortical (epidermal) cells tangentially length
 - 8 μm Minimum value
 - 10 μm Lower value of unspecified range (could be $\mu\text{-s.d.}$, but not known)
 - 22 μm Upper value of unspecified range (could be $\mu\text{+s.d.}$, but not known)
 - 25 μm Maximum value
- anatomy mantle cross-section cortical (epidermal) cells radially diameter
 - 11 μm Minimum value
 - 14 μm Lower value of unspecified range (could be $\mu\text{-s.d.}$, but not known)
 - 40 μm Upper value of unspecified range (could be $\mu\text{+s.d.}$, but not known)
 - 45 μm Maximum value

Anatomy of the Hartig net in cross-section

- presence
 - present
- kind
 - one or half a row of cortical cells adjoining endodermis free of Hartig net
- anatomy mantle cross-section hyphal cells around cortical (epidermal) cells shape
 - roundish
 - or cylindrical
- anatomy mantle cross-section hyphal cells around cortical (epidermal) cells thickness
 - 1 μm Minimum value
 - 1.5 μm Lower value of unspecified range (could be $\mu\text{-s.d.}$, but not known)
 - 2.5 μm Upper value of unspecified range (could be $\mu\text{+s.d.}$, but not known)
 - 3 μm Maximum value
- anatomy mantle cross-section hyphal rows around cortical (epidermal) cells number
 - one

Anatomy of the emanating elements in general

Anatomy of cystidia (type 1)

- type
 - awl-shaped, bristle-like (type A)
- ramification presence-position
 - absent
- septa presence
 - present
- septa kind
 - simple
- diameter { proximal }
 - 4 μm Lower value of unspecified range (could be $\mu\text{-s.d.}$, but not known)
 - 5 μm Upper value of unspecified range (could be $\mu\text{+s.d.}$, but not known)
- diameter { distal }
 - 2 μm Lower value of unspecified range (could be $\mu\text{-s.d.}$, but not known)
 - 3 μm Upper value of unspecified range (could be $\mu\text{+s.d.}$, but not known)
- length
 - 300 μm Minimum value
 - 450 μm Lower value of unspecified range (could be $\mu\text{-s.d.}$, but not known)
 - 800 μm Upper value of unspecified range (could be $\mu\text{+s.d.}$, but not known)
 - 900 μm Maximum value
- cell wall colour
 - brownish
- cell wall colour { relative to mantle cells }
 - similar
- cell wall thickness
 - 1 μm Lower value of unspecified range (could be $\mu\text{-s.d.}$, but not known)
 - 1.5 μm Upper value of unspecified range (could be $\mu\text{+s.d.}$, but not known)
- cell wall thickness { relative to mantle cells }
 - similar in thickness
- cell wall evenness
 - even in thickness
- surface habit
 - smooth
 - or warty
- contents presence
 - absent
- contents type
 - absent

Anatomy of emanating hyphae

- shape
not striking
- drops of exuded pigment presence
absent

Anatomy of the septa of emanating hyphae

- clamps presence
absent

Anatomy of the cells of emanating hyphae

- anatomy emanating elements emanating hyphae cell shape { at distal end}
simple
- anatomy emanating elements emanating hyphae cell diameter
 - 4 μm Minimum value
 - 5 μm Lower value of unspecified range (could be $\mu\text{-s.d.}$, but not known)
 - 10 μm Upper value of unspecified range (could be $\mu\text{+s.d.}$, but not known)
 - 11 μm Maximum value
- anatomy emanating elements emanating hyphae cell length
 - 10 μm Lower value of unspecified range (could be $\mu\text{-s.d.}$, but not known)
 - 40 μm Upper value of unspecified range (could be $\mu\text{+s.d.}$, but not known)
- anatomy emanating elements emanating hyphae cell wall surface habit
 - without lens-shaped appositions
 - or with spindle-shaped appositions
- anatomy emanating elements emanating hyphae cell wall thickness
 - 0.2 μm Lower value of unspecified range (could be $\mu\text{-s.d.}$, but not known)
 - 1 μm Upper value of unspecified range (could be $\mu\text{+s.d.}$, but not known)

Anatomy of rhizomorphs

- type
lacking, only emanating hyphae present
(type G)

Anatomy of hyphae in rhizomorphs

Anatomy of chlamydospores

- presence
absent

Anatomy of haustoria

- { of ectomycorrhiza former } presence
present
- { of ectomycorrhiza former } abundance
occasionally present
- { of foreign origin } presence
absent

Anatomy of nuclei

- number { per cell }
 - 1 Lower value of unspecified range (could be μ -s.d., but not known)
 - 2 Upper value of unspecified range (could be μ +s.d., but not known)

Autofluorescence

- whole mycorrhizae UV 254 nm colour-presence
absent
- whole mycorrhizae UV 366 nm colour-presence
absent
- mantle in section UV-filter 340-380 nm presence
present
- mantle in section blue-filter, 450-490 nm presence
present
- mantle in section green-filter, 530-560 nm presence
present

Chemical reactions

- reaction with cotton-blue-lactic-acid presence
present
- reaction with ethanol 70% presence
absent
- reaction with FeSO₄ presence
present
- reaction with formol 40% presence
absent
- reaction with guaiac presence
absent
- reaction with KOH 10% presence
present
- reaction with lactic acid presence

absent

- reaction with Melzer's reagent presence
absent
- reaction with phenole presence
absent
- reaction with sulpho-vanillin presence
absent

Ecology

- geographic occurrence continent
Europe
- knowledge about association with foreign fruitbodies presence
unknown

Tree

- plant family
Betulaceae
- plant genus
Corylus
- plant habitat kind
nursery

Fungus

- family
Tuberaceae
- fruitbodies growth habit
hypogeous

Remarks

- public notes
Mycorrhizal systems very irregularly ramified; mycorrhizal ends brown to reddish brown.