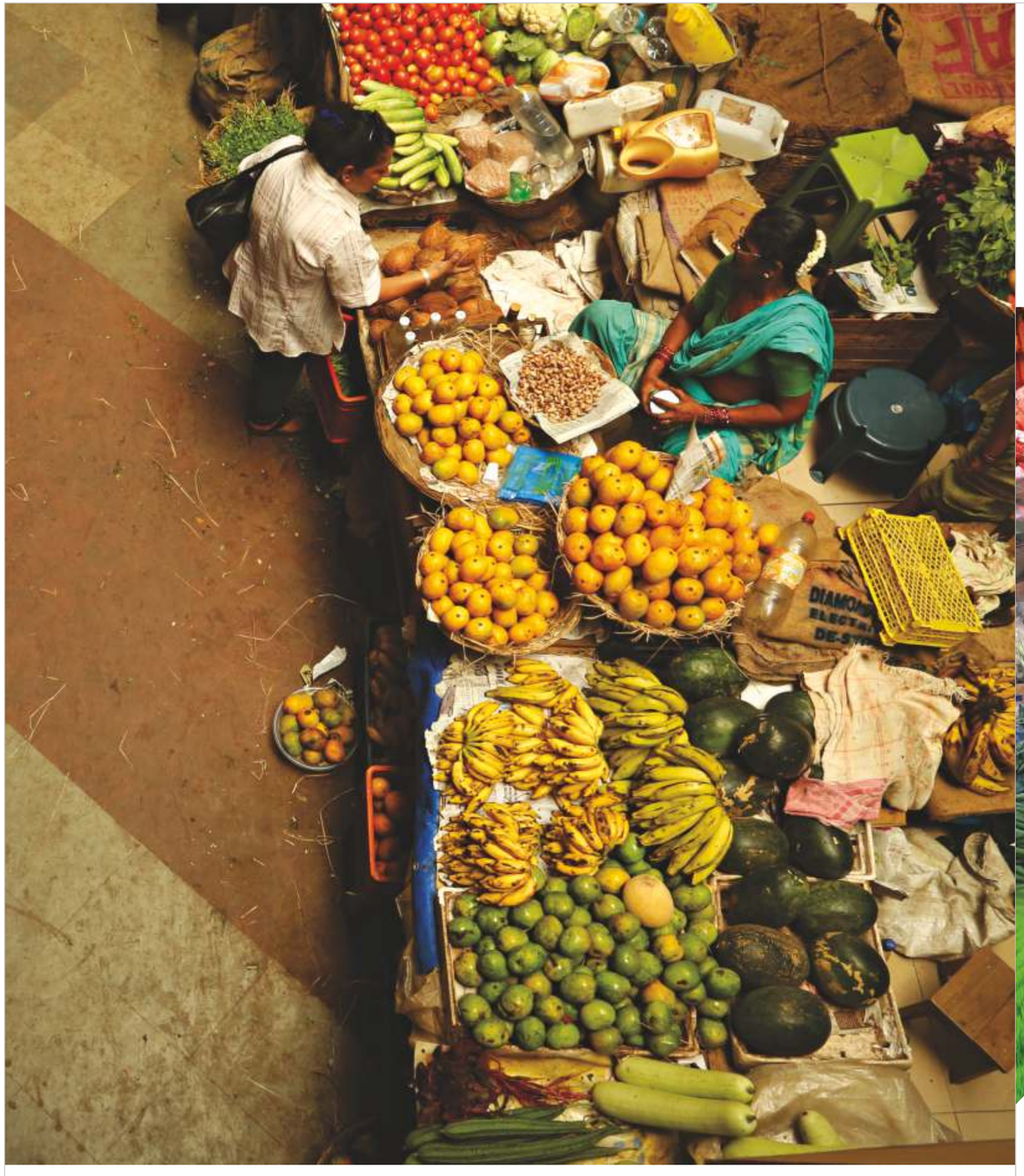

UNEP-GEF-MoEFCC-ABS PROJECT

"Strengthening the implementation of the Biological Diversity Act and Rules with focus on its Access and Benefit Sharing (ABS) Provisions"

TRADABLE BIORESOURCES OF GOA

Goa State Biodiversity Board

(An Autonomous Statutory Body)
Government of Goa

Government of India | Ministry of Environment, Forest & Climate Change | National Biodiversity Authority, India | Government of Goa | Goa State Biodiversity Board | United Nations Environment Programme | Global Environment Facility

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TRADABLE BIORESOURCES OF GOA

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Dr. Pradip Sarmokadam
Member Secretary
Goa State Biodiversity Board

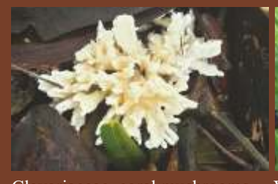
CONTENT

A cluster of wild edible fully mature *Termitomyces heimii*

Goas major traded wild edible mushroom *Termitomyces heimii* cultivated by the termites and getting depleted

Agriculturally useful ectomycorrhizal *Pisolithus albus* an Australian import

Wild edible Agaricus campestris close relative of cultivated button Mushroom, not consumed locally



Clavariaceae, coral mushrooms are very dominant near tree roots in Goa with huge pharmaceutical potential

Very common *Macrolepiota rhacodes*, not edible locally

Indotermitomyces Kamat thought to be an entirely new genus of wild edible mushroom in Goa under research

Wild edible shiti, shitol or shringar olami, *Termitomyces microcarpus* which fruit at end of Mansoon

Phallaleles, the wild viscid stinkhorn mushrooms are shunned by local people but are cultivated in China and have great potential for cultivation in Goa

Calvatia sp. a puffball, medicinal

MUSHROOM BIODIVERSITY OF GOA

Dr. Nandakumar M. Kamat
Department of Botany, Goa University,
Taleigao, Goa

World is divided into "biodiversity Haves and Have-nots". Goa is favorably placed in the later. Biodiversity functions at three levels-ecosystem, species and genes. Scientists have recorded about two million species. But undiscovered species range from six to hundred million. India has about 130 thousand species with almost a million to be discovered. Goa could have 50000 to hundred thousand species but can report 10000 already known. Catalogued species would be less than 5000 and other 5000. It would take a century of survey work for ATBI (All Taxa Biodiversity Inventory) of Goa.

Evolution of Mushroom biodiversity in Goa

Over 1200 fungal species including 500 mushrooms are known from tiny state of Goa. An estimated 5-6 thousand species of fungi would be found in Goa. Most of these have an evolutionary history of more than 100 to 1000 million years. Goa, sporting some of oldest rocks is a microscopic dot on 510 million kms. surface of earth. But this dot has seen a lot in time and space as it formed, deformed and reformed with moving plates and rise and fall of continents. Over hundreds of millions of years Goan landmass moved from far south of equator to the north. So story of life in Goa from micro to macro forms is story of biological evolution adapting to geological upheavals and climate changes. Earth is 4600 million years old planet. Life in primitive microbial form on Earth evolved about 4000 million years ago. Some of these simple microorganisms with open DNA further evolved. They lacked Chlorophyll and could not use sunlight for producing their food. Some developed true nucleus and became eukaryotes. About 1100 million years ago some eukaryotes in one ancient lineage decided to remain single celled and became Yeasts. Other eukaryotes in this lineage preferred elongated cells called hyphae capable of extension and became filamentous fungi. For almost 700 million years there were no plants to be seen. Plants evolved around 428-450 million years ago and made fungi in soil their partners. The evolutionary drama after this took strange twists and turns finally delivering an estimated 100 thousand species to taxonomists and a claim for one to six million more species of fungi yet to be discovered.

Mushroom diversity- Global, National, Local

World famous mushroom biologists Shu-Tin Chang and Philip Miles define mushroom as fruiting body of macrofungi. They estimate 14000 mushrooms known in the world but feel that actually 140000 mushroom species may exist on this planet. So we know only 10 percent of global mushroom biodiversity. Chang and Miles (2004) report that " about 7000 species possess varying degrees of edibility, and more than 3000 species may be considered prime edible species, of which only 200 species have been experimentally grown, 100 economically cultivated, approximately 60 commercially cultivated, and about 10 species cultivated on an industrial scale. In addition, 2000 species have been suggested to possess medicinal properties." In 1995 in an international workshop I had reported that –"Mushrooms in India are very diverse but not well known. India has from 1105 to 1208 species of mushrooms belonging to 128-130 genera. Of these, only 300-315 species belonging to 75-80 genera are considered edible. The Western Ghats have a wealth of mushroom flora: 700-750 species belonging to 70-75 genera. Of these, only 70-80 species are known by local communities in Maharashtra, Karnataka, Goa, Kerala and Tamil Nadu to be safe for human consumption."

If I extend Chang and Miles 2004 global estimate to our country then this statement can be made-" 14500 different species of fungi are known from India. At least 2-2500 are mushrooms. About 1000 species possess varying degree of edibility. About 400 are prime edible species. "As for Goa during past 30 years of research, along with my students and research fellows I could survey, identify and catalogue more than 500 mushroom species. About 150 species possess varying degree of edibility but only 30-40 are prime edible species.

Such information is revised every year and is subject to change in future as we find identical species or correct wrong identifications. The table at the end of the article gives a checklist of 198 of 500 mushroom species. Several novel species are under molecular investigations without which these cannot be published.

The humid, tropical climate in Goa with abundant rainfall is beneficial for proliferation of species from simplest of bacteria to largest of the mammals. Goa has 12 distinct ecosystems, hundreds of habitats, thousands of species and vast genetic diversity. There are two knowledge banks of biodiversity- the traditional and the formal, research based. Traditional knowledge banks provide us Ethnobotanical, Ethno-pharmacological, Ethno-mycological, Ethnozoological information. Empirical research in field and in laboratories, in herbaria and botanical gardens and microbial culture collections provide us with information on scientific understanding of biodiversity. As compared to larger and more glamorous species, the lowly fungi have attracted poor attention, except by mycologists. Microorganisms get some publicity only during the monsoon because of Goa's Ethno-mycological traditions.

The Western Ghats mushroom flora closely resemble flora of Africa and South America. This affinity is related to geodynamical events like plate tectonics as mentioned above. Saprophytic or decomposer mushroom genera such *Lepiota* and *Macrolepiota*, plant litter degrader species like

Mycena, *Marasmius* (we lost the count of these two genera, there could be 500+ species in Goa), opportunistic parasites such as *Pleurotus* and *Lentinus termite* cultivated fungi such as *Termitomyces*, and *ectomycorrhizal* partners such as *Russula* help maintain the ecosystem by catalyzing the mineralization of organic matter.

Carnivorous mushrooms species control nematode populations. Edible mushrooms provide a seasonal source of food to tribes. Wild mushrooms and their habitats such as termite hills have become fountainheads of folk belief systems and interlinked cults.

Mushroom diversity in Goa's Ethno-myco

Goa's Ethno-mycological traditions are some of world's oldest dating back from Paleolithic (60000 YBP) to megalithic (4000 YBP) period. What plants mean in Ethnobotany, fungi and mushrooms mean in Ethno-mycology. Practice of consuming mushrooms is studied under “Ethno-mycophagy”. Wild edible mushrooms have interesting local names. These are derived from either the habitat (e.g., Roen olmi = termite hill mushroom), shape (Khut olme = mushroom with crutch, Fugo = balloon), colour (Tamdi olmi – red coloured), size or occasionally the fruiting season (Shit) olmi, which fruit during winter).

Like in other parts of world in entire west coast- Western Ghats region discovery of edible and medicinal mushrooms was made at 'hunter- food-gathering' stage during Paleolithic period. Goudeller and Korisettar in 1993 found Acheulean quartz hand axes in Goa thus confirming entry of anatomically modern Homo sapiens about 50-60000 thousand years ago. Work by R. Gordon Wasson, Guzman, Roger Heim, Terence Mckenna and several others have focused on a group of mood and mind altering psychedelic chemicals called Entheogens. Entheogens means “divinity creating chemicals”. Those who ingest them can “see God”. So the Palaeolithic food gatherers in Goa were searching both types of mushrooms- those which could give them an emotional “high” a psychic kick and the non toxic edible varieties. The same principle of observations, trial, error used to identify edible plants was used to identify consumable mushrooms.

We have found psychedelic mushroom species like *Psilocybe, Panaeolus* in Goa. These must have been consumed raw in moderate quantities in special rituals. For several thousand years these “mushroom drug parties” could have taken place in forests of Goa as more and more nomadic humans entered from Deccan plateau and moved towards the Arabian Sea in search of elusive sea-salt. On the way to the coast, they put a camp at Panasaimal, Kolamb on the banks of Kushavati or Paroda river. There they created one of largest rock art gallery. People of this 'Kushavati culture” (See article in Goa Today, June 1993) left behind a mycoglyph- a carving of *Psychedelic Psilocybe mushroom* fruit body, mistaken by people and researchers unfamiliar with shamanism and Entheogens as a petroglyph of “spear” or “arrow”. But these petroglyphs belong to pre-metallurgical (pre chalco-megalithic) age. Cave murals in Spain, Algeria clearly show (see the figures below) psychedelic mushrooms. Mushrooms and myoglyphs in world rock art need a separate article.

Among the wild edible mushroom species we have largest number about 25-30 from Genus Termitomyces – mushrooms which are actually produced by the termites as their food. These termite species belong to *Odontotermes obesus, O. feae , O. wallonensis, O. redemanii, O. malabaricus, O. brunneus* besides *Macrotermes* and *Microtermes sp*. Some build huge mounds and rest build nests underground without ventilators.

As their name suggests, termite hill (or "termitophilic") mushrooms grow on these termite hills. Termites cultivate these mushrooms and eat them to obtain enzymes and nitrogen. People harvest the mushrooms which emerge from the underground fungal combs and market them in large quantities. The entire life cycle of these popular mushrooms is considered ecological magic by local termite-hill goddess worshippers. The mushrooms have given rise to many interesting taboos and folk beliefs. For instance, the termite hills are closely guarded and revered as the abode of a popular local goddess. These beliefs once checked the exploitation of mushrooms and destruction of the termite hills, but a sudden spurt in consumer demand for wild termite hill mushrooms (especially in Goa) is threatening this conservation ethic. Almost half the above-ground plant litter in the Western Ghats forest and bamboo groves are recycled by Termitomyces. This is a vital way the soil nutrient reservoir is enriched.

Importance of *Termitomyces* mushroom biodiversity

Each hectare of forest in the Western Ghats has about 810 termite hills. In mixed forests, termites invade between 21 and 79 percent of trees. Termites turn over large amounts of soil by plastering on trees and the ground. The plant material taken inside the termite hill ends up in the "fungal comb". Each comb weighs 2831 kg. The *Termitomyces* fungus in the comb decomposes 167 to 341 kg of organic matter annually.

Mushroom Biodiversity and Ecotheology

Santeri the termite hill goddess is venerated in Konkan, Goa and Kanara and is also known as Bhumika, "Shantala" or "Shantadurga". Every temple has a holy termite in the sanctum sanctorum.

I had published a research article 'Ecotheology of termite hill' on the cult of Santeri- the goddess of termite hill mushrooms in Govapuri the former Bulletin of Institute Menezes Braganza (Vol. 1:3, Oct-Dec,1999) in which I had discussed the hidden aspects of ecological magic of termite hill-“ there is a scientific explanation of the fertility aspect of the termite hills. The termite hills are built by termites over a period of 2-3 years. Termites are social insects having different classes and a system of division of labour. Only the termites of Macrotermitinae sub-family build massive over ground mounds/hills. Each hill has many compartments where the termites store their food. This food is composed of plant matter. The termites grow a type of fungus called Termitomyces over this food-pile. The fungus grows on the pile and makes its digestion easier for the termites. After rains the fungus grows very fast. The walnut shaped mass inside each compartment shows growth of small needles. The needles grow further through the soil. They look like small serpents, with bulbous hoods. After penetrating the roof, the snake-like objects grow further through the soil. After penetrating the roof the snake-like objects grow further. At this stage they look like erect phalluses or hooded snakes. After a few days the growth is complete. A beautiful umbrella like object with a cylindrical support and a ring is seen. It gives a fruity smell. This is the well known 'Termitomyces' mushroom. It could be show that at hunting-food gathering stage the food-value of these mushrooms had been discovered. The food-generating capacity of the termite-hill, after insemination by rains, was considered as fertility magic by the women-Shamans. Further, the food-piles, if a termite hill is excavated or destroyed, look like animal-brains. For a hunting community, the association was not difficult.

Termite-hill thus became a cult-symbol and the snake-like forms, white at the top and black underneath, the immature or pseudorhizal stage of Termitomyces mushrooms were transformed into Kshetrapala gods -the consorts of Santeri, Renuka and Yellamma. The origin of all phallic shaped forms associated with the cults of termite-hill worship thus have to be related to specific stages of Termitomyces mushroom-life cycle. This explains the origin of' lingadevas' and 'stambhadevas' devoid of yonis/pithas or shalunkas found in South Konkan, Goa and Canara.

The Shiti Olamis

Shiti olamis, also known by vernacular names such as Chhiti, Xiti (Sanguem, Quepem, Canacona), Shiti / Shitol (Salcete, Marmagoa, Tiswadi, Bardez, Ponda, Dharbandora, Bicholim), Sringar (Pernem, Bicholim) are encountered from mid August to November, rarely in January. Etymology of these names shows that “Chhiti means small, shit/Shitol means “under cold conditions” and “Sringar” means 'well adorned or beautiful”. The scientific name of these species is *Termitomyces Microcarpus Heim* (1942) or *Podabrella microcarpa* in sensu singer (1986). These species are collected in hundreds and consumed on same day.

The Pioneer Mushroom species

With first rains we find some strange looking mushrooms , the tennis ball, golf ball or flask shaped or bottle shaped “puffballs” followed by “ birds' nest fungi”, 'earthstars” , “Stinkhorns” and “cage” mushrooms. These species belong to *Bovista, Calvatia, Lycoperdon* and *Scleroderm*a the common puffballs of Goa. All are non edible but medicinal species. The white Bovista can easily be mistaken for table tennis ball or a small bird egg. *Calvatia* white puffballs look exactly like a golf balls, with beautiful surface ornamentation. *Lycoperdon* are pale biscuit or chocolate coloured cute puffballs, with a small stalk. Scleroderma is similar to *Calvatia* and is distinguished by a darker shade and deeper surface ridges. But the winner among puffballs is golden spore producing *Pisolithus*. This species has been imported in Goa alongwith Australian acacia. Birds' nest fungi are tiny cups in which are nestled 'eggs” or peridioles filled with spores. *Cyathus Striatus* is a common species in Goa which often appears on dead twigs. These strange looking mushrooms wait for the drops of rain to fall in the cup when the spores are shot out like cannonballs. Earthstars, found on rotting leaves on wet ground and well camouflaged belong to Geastrum species. Stinkhorns or mushrooms of *phallaceae* family which develop rapidly from very slimy egg stages appear nasty because of their phallic shape, strong odour, slimy cap and a perforated skirt like organ called “indusiam'. *Phallus* and *Dictyophora* are common species in Goa which prefer Bamboo groves and litter. Most beautiful and cute are “cage” mushrooms with a complex cage like design and come up on fertile soils and litter. A red cage mushroom - *Clathrus ruber* and *Clathrus chrysomycelinus* are cage mushroom species found in Goa,

Bioluminescent mushrooms

Mycelium and fruiting bodies of bioluminescent mushroom species such as *Lampteromyces japonicus*, found in Western Ghat forests, emit a faint blue-green or violet light, occasionally illuminating entire forest at night. This "ghost glow" helps in spore dispersal. A species was collected at midnight few years ago glowing blue on jackfruit tree and donated for research by Suhas Thalur of Lamgao, Bicholim. From September people who enter in or trek inside forests in western ghats report “devcharachi chud” (Forest spirit's torch) as the whole forests lights up due to bioluminescent mushrooms.

Conserving Mushroom biowealth

Suggested measures (Kamat 1995) for Goa's mushroom biodiversity include - extensive survey, documentation identification and cataloguing of mushroom species, Market surveys to establish exploitation consumption/ trends, field studies to identify "hot spots", notification of endangered species and habitats, demarcation of "micro-bioreserves" of fungi/mushrooms, detailed plan for controlled exploitation of non-endangered species on basis of phenological studies, Ex-situ conservation in the form of dried herbarium, spore-deposits and mycelial (tissue) cultures, domestication of wild edible species e.g., *Termitomyces* for commercial cultivation, establishment of valuable mushroom germplasm banks, development of wild species mycelial culture to manufacture bioactive molecules, enzymes, polysoccharides, protein pellets, flavour and natural mycodyes, e.g., melanin, Culture of *ectomycorhizal* species as bio-inoculants for use in agroforestry, creating public awareness campaign through the mass media, aesthetic use of mushroom biodiversity for nature promotion, e.g., in philately, models, cards and

games, removal of techno-legal ambiguities in existing Eco-conservation and forest protection laws to incorporate concerns regarding fungal and mushroom biodiversity, involvement of local communities and NGOs in a biodiversity awareness drive.

However not much has been done in past 20 years since these measures were suggested to the state government.

Box item 2

Mushroom research at Mycolab , Botany department , Goa University

More than 20 students have worked under the author on several aspects of mushroom diversity of Goa since 2001-02. Asavari Kulkarni reported 15 mushroom species belonging to 13 genera 6 families and successfully produced the spawn for *Pleurotus* and *Auricularia* spp. and reported medically important lectin activity from *Auricularia*. Harshala Gad surveyed 4 sites to get *Termitomyces* fungus comb and studies obtained 31 variants. Rajashri Patil isolated 51 mushroom cultures. Paramjeet Kaur improved commercial button mushroom strain, produced OHP transparency and FTIR technique for mushrooms, detected lectin from button mushroom basidiospores and developed non destructive tech for spectral characterization of mushroom spores. Amisha G. Shirodkar worked on calcium oxalate biominerlization in *Ganoderma lucidum* cultures. Trupti S. Vernekar isolated 50 mushroom cultures. Suchita Naik surveyed 14 locations and collected 624 mushroom specimens, 65 spp. of basidiomycetes which included 15 medicinal, 9 toxic spp. Charmaine desouza catalogued mushroom biodiversity of Panaji and Porvorim and made 31 collections and identified 72 spp. of basidiomycetes. Devika S. Priolkar surveyed mushrooms of south Goa and reported 30 spp. placed in 8 orders and 13 families. Rosy Agnes Dsouza studied role of termite mushrooms in ecosystem and produced mushroom pellets and extracted Melanin. Ligi V.L. worked on mushrooms which form lichens and endo-symbionts of *Nostoc* and their phylogeny. Khusboo Khatun and Maiza Xec worked on mushrooms which can kill unwanted soil nematodes which damage crops. Arvisha Petkar made pioneer studies of mushroom biodiversity of Pernem taluka and reported 100 species. Similar work was done by Ankita Mopkar to map the mushroom diversity of Bicholim taluka. Presently several students are cataloguing the mushroom diversity of Pernem, Bardez, Tiswadi, Sattari and Sanguem.

Box item

Biodiversity of some common and rare mushrooms (non edible, edible and toxic) of Goa, a complete validated list of 500 species would be published in 2019-20+. The novel Genus *Indotermitomyces* is a tentative claim awaiting molecular identification. Several lower taxa such as forms and varieties have been excluded. Where species names are not given, the literature to identify the same was insufficient and these could be possibly novel taxa.

1. *Agaricus arvensis* Schaeff.
2. *Agaricus augustus* Fr.
3. *Agaricus campestris* Var. campestris L.
4. *Agaricus purpurellus* (F. H. Moller) F. H. Moller
5. *Agrocybe praecox* (Pers.) Fayod
6. *Agrocybe* sp.
7. *Amanita phalloides* (Vaill. ex Fr.) Link
8. *Amanita* sp.1
9. *Amanita* sp. 2
10. *Amanita caesarea*
11. *Amanita spreta* (Peck) Sacc.
12. *Antrodiella semisupina* (Berk. & M. A. Curtis) Ryvarden
13. *Ascocoryne sarcoides* F. novel
14. *Auricularia mesenterica* (Dicks.) Pers.
15. *Auricularia polytricha* (Mont.) Sacc.
16. *Auricularia* sp.
17. *Bolbitius* sp.
18. *Boletus aestivalis* (Paulet) Fr.
19. *Boletus* sp.
20. *Bovista nigrescens* Pers.
21. *Bovista plumbea* Pers.
22. *Calocybe* sp.
23. *Calocera cornea* (Batsch) Fr.
24. *Calocera viscosa* (Pers.) Fr.
25. *Calvatia cyathiformis* (Bosc) Morgan
26. *Cantharella cyathiformis*
27. *Cheilymenia granulata* (Bull.) J. Moravek
28. *Chlorophyllum molybdites* (G. Mey) Massee
29. *Clavaria* sp.
30. *Clavulina corralloides* (L.) J. Schrot.
31. *Clavulina* sp.
32. *Clitocybe clavipes* (Pers.) P. Kumm.
33. *Clitocybe gibba* (Pers.) P. Kumm.
34. *Clitocybe infundibuliformis* sensu auct.
35. *Clitocybe nebularis* (Batsch) Quél
36. *Collybia confluens* var. confluens (Pers.) P. Kumm.
37. *Collybia distorta* (Fr.) Quél
38. *Collybia dryophila* (Bull.) P. Kumm
39. *Collybia fusipes* (Bull.) Quel.
40. *Collybia* sp.
41. *Coltricia perennis* (L.) Murill
42. *Coprinus comatus*
43. *Coprinus atramentarius* (Bull.) Fr.
44. *Coprinus micaceus* (Bull.) Fr.
45. *Coprinus* sp. 1
46. *Cortinarius plicatus*
47. *Cortinarius* sp.1
48. *Cortinarius* sp.2
49. *Crepidotus mollis* (Schaeff.) Staude
50. *Crepidotus* sp.
51. *Cystolepiota* sp.1
52. *Cystolepiota* sp. 2
53. *Daedalea quercina* (L.) Pers.
54. *Daedaleopsis confragosa* (Bolton) J. Schröt
55. *Daldinia concentrica* (Bolton) Ces. & De Not.
56. *Detronia mollis* (Sommerf.) Donk
57. *Exidia truncata* Fr.
58. *Fomitopsis pinicola* (Sw.) P. Karst.
59. *Ganoderma applanatum* (pers.) Pat.
60. *Ganoderma lucidum* (Curtis) P. Karst.
61. *Ganoderma* sp.
62. *Ganoderma tsugae* Murill
63. *Geastrum Lageniforme* Vittad.
64. *Gloeophyllum abietinum* (Bull.) P. Karst.
65. *Gomphus* sp.
66. *Gymnopilus sapineus* (Fr.) Maire
67. *Hebeloma* sp.
68. *Hydnum* sp.

69. *Hygrocybe* sp. 1
70. *Hygrocybe miniata* sensu Phillips
71. *Hygrophorous eburneus* (Bull.) Fr.
72. *Hygrophorus* sp.1
73. *Hygrophorus* sp.2
74. *Hypholoma* sp.1
75. *Hypoloma* sp.2
76. *Ischnoderma benzoinum* (Wahlenb) P. Karst.
77. *Laccaria amethystina* Cooke
78. *Lentinus cochleatus* (Pers.) Fr.
79. *Lentinus giganteus* Berk.
80. *Lentinus nigripes* Fr.
81. *Lentodium* sp.
82. *Lenzites betulina* (L.) Fr.
83. *Lepiota acutesquamosa* (Weinm.) P. Kumm.
84. *Lepiota clypeolaria* sensu Rea
85. *Lepiota cristata* Barla
86. *Lepista nuda* (Bull.) Cooke
87. *Leucoagaricus fragilismus*
88. *Leucoagaricus* sp.1
89. *Leucocoprinus* sp.2
90. *Leucocoprinus birnbaumii* (Corda) Singer
91. *Leucocoprinus fragilissimus* (Berk. & M.A. Curtis) Pat.
92. *Leucocoprinus lilacinogranulosus* (Henn.) Locq.
93. *Leuoagaricus* sp.
94. *Lycoperdon perlatum* Schaeff.
95. *Lycoperdon pyriforme* Schaeff.
96. *Lycoperdon* sp.
97. *Lyophyllum aggregatum* (Schaeff.) Kühner
98. *Lyophyllum* sp.1
99. *Lyophyllum* sp.2
100. *Macrolepiota bulbosa*
101. *Macrolepiota excoriata* (Schaeff.) M. M. Moser
102. *Macrolepiota procera* (Scop.) Singer
103. *Macrolepiota puellaris* (Fr.) M.M. Moser (1967
104. *Macrolepiota rhacodes* (Bon) Gminder (2003) strain2
105. *Macrolepiota rhacodes* (Vittad.) Singer
106. *Marasmiellus candidus* (Bolton) Singer
107. *Marasmiellus* sp.
108. *Marasmius androsaceus* (L.) Fr.
109. *Marasmius haematocephalus* (Mont.) Fr.
110. *Marasmius oreades* (Bolton) fr.
111. *Marasmius rotula* (Scop.) Fr.
112. *Marasmius scorodonius* (Fr.) Fr.
113. *Mycena galericulata* (Scop.) Gray
114. *Oligoporus* sp.
115. *Oligoporus stipticus* (Pers.) Gilb. & Ryvarden (1987)
116. *Oligoporus tephroleucus* (Fr.) Gilb. & Ryvarden
117. *Omphalina* sp.1
118. *Omphalina* sp.2
119. *Omphalotus olearius* (DC.) Singer
120. *Panaeolus* sp.
121. *Panus* sp.
122. *Panus conchatus* (Bull.) Fr.
123. *Panus purpuratus* G. Stev.
124. *Panus tigrinus* (Bull.) Singer
125. *Phallus impudicus* L.
126. *Phellinus gilvus* (Schwein.) Pat.
127. *Phellinus* sp.
128. *Phellodon tomentosus* (L.) Banker
129. *Pholiota destruens* (Brond.) Gillet
130. *Pholiota lucifera* (Lasch) Quel
131. *Pholiota* sp.1
132. *Pholiota* sp.2
133. *Pholiota squarrosa* (Weigel) P. Kumm.
134. *Pisolithus albus* (Cooke & Massee) Priest (1998
135. *Pisolithus tinctorius* (Pers.) Coker & Couch
136. *Pleurotus aureolarius*
137. *Pleurotus cystidiosus* O.K. Mill. (1969),
138. *Pleurotus djamor* (Rumph. ex Fr.) Boedijn
139. *Pleurotus eous* (Berk.) sacc
140. *Pleurotus fossulatus* Cooke
141. *Pleurotus ostreatus* sensu Cooke
142. *Pleurotus populinus* O. Hilber & O.K. Mill.
143. *Pleurotus pulmonarius* (Fr.) Quel.
144. *Pluteus* sp.3
145. *Podaxis Pistillaris* (L.) Fr.
146. *Polyporus aureolus* (Pers.)
147. *Polyporus brumalis* (Pers.) Fr.
148. *Polyporus* sp.1
149. *Polyporus* sp.2
150. *Psathyrella conopilea*
151. *Psathyrella* sp.1
152. *Pterula multifida*
153. *Pycnoporus cinnabarinus* (Jacq.) Fr.
154. *Schizophyllum commune* Fr.
155. *Scleroderma citrinum* Pers.
156. *Sparassis crispa* (Wulfen.) Fr.
157. *Steccherinum ochraceum* (Pers.) Gray
158. *Stereum hirsutum* (Willd.) Pers.
159. *Stereum* sp.
160. *Stereum striatum* (Fr.) Fr.
161. *Stropharia semiglobata* (Batsch) Quél.
162. *Suillus porvorimnensis*
163. *Termitomyces globulus* R. Heim & Gooss.-Font.
164. *Termitomyces heimii* Natarajan
165. *Termitomyces microcarpus* R. Heim
166. *Termitomyces albuminosus* (B erk.) R. Heim
167. *Termitomyces bulborhizus* T. Z. Wei, Y.J. Yao, B. Wang & Pegler
168. *Termitomyces clypeatus* R. Heim f. major
169. *Termitomyces entolomoides* R . Heim
170. *Termitomyces eurrhizus* (Berk .) R. Heim
171. *Termitomyces fuliginosus* R. Heim
172. *Termitomyces longiradicatus* Sathe & J.T. Daniel
173. *Termitomyces mammiformis* R. Heim
174. *Termitomyces medius* R. Heim & Grassé
175. *Termitomyces orientalis* R. Heim
176. *Termitomyces robustus* (Beeli) R. Heim
177. *Termitomyces striatus* (Beeli) R. Heim
178. *Termitomyces umkowaan* (Co oke & Massee) D.A. Reid
179. *Termitomyces santerei*
180. *Termitomyces dudhsagrensis*
181. *Indotermitomyces gomantakiensis*
182. *Indotermitomyces petaloides*
183. *Indotermitomyces porvoriemensis*
184. *Indoermitomyces santacruzensis*
185. *Indotermitomyces korgaoensis*
186. *Indotermitomyces taleigaoensis*
187. *Termitomyces* sp.1
188. *Termitomyces* sp.2
189. *Thelephora terrestris* Ehrh.
190. *Trametes gibbosa* Pers. Fr.
191. *Trametes hirsuta* (Wulfen) Pilát
192. *Trametes* sp.
193. *Trametes versicolor* (L.) Lloyd
194. *Tricholoma lascivum* (Fr.) Gillet
195. *Tricholoma* sp.1
196. *Volvariella bombycina* (Schaeff.) Singer
197. *Volvariella gloiocephala* (DC.) Boekhout & Enderle
198. *Xerula goanenis*, sp. Nov. De Souza and Kamat, 2017
199. *Volvariella pusilla* (Pers.) Singer
200. *Xerula mucida*
201. *Xerula radicata* (Relhan) Dorfelt