

Taxol from *Taxomyces Andreanae*

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Abstract

Taxomyces andreanae is an endophytic fungus of the class hyphomycetes which colonize the intra or intercellular regions of the plant to establish a symbiotic interaction. These fungi are capable of producing various secondary bioactive metabolites which possess anti-microbial and anticancerous properties. One such compound is Taxol. In addition, in a symbiotic association, *Taxomyces andreanae* increase the resistance of plant towards abiotic /biotic stresses.

Keywords: Taxol; Bioactive; Symbiotic; Anticancerous; Steroids, Alkaloids.

Introduction

Taxomyces andreanae is an endophytic fungus which is well known for its symbiotic association with its host plant *Taxus brevifolia* and is capable of producing the anticancerous bioactive compound Taxol [1,2]. Various significant bioactive mixtures from *T. andreanae* with antimicrobial and anticancerous properties have been effectively isolated in the past twenty years [3]. These bioactive compounds include alkaloids, terpenoids, steroids, phenols and lactones [4,5]. In the symbiotic association the host plant can supply adequate nutrition and easeful niche for the endurance of its endophytes and in return the endophytes can deliver an adequate measure of bioactive components for aiding the host plants to adapt to biotic and abiotic stress, thus promoting its development [6,7]. The bioactive compound Taxol is also known to be produced in other host plants, such as *T. baccata*, *T. chinensis* and *T. canadensis* [8,9]

Taxol

Taxol is an anticancerous chemotherapeutic drug also known as a plant alkaloid (taxane) [10]. It was first isolated by Monroe Wall, Mansukh Wani and his associates at the Natural Products Laboratory of the Research Triangle Institute along with camptothecin, another anticancerous compound [11,12]. Taxol is an oxygenated diterpenoid compound isolated from the bark of Pacific yew tree (*Taxus brevifolia*) [13]. Taxol also commercialized by the name of Paclitaxel, it promotes the development and stabilization of the tubulin polymer unlike other anticancer drugs that incite microtubule dismantling [14]. Taxol exhibit poor solubility therefore is prepared as solutions in Cremophor EL and dehydrated alcohol [15,16].

Synthesis of Taxol

Taxol production in *Taxus* plants involves at least 20 enzymatic reactions [17]. The biosynthetic pathway begins with the cyclization of geranylgeranyl diphosphate to form taxa-4(5), 11(12)- diene and involves compounds from a few unique classes that are situated in various cell compartments, including the plastid, endoplasmic reticulum and cytosol [18,19]. Microbial Taxol and texane biosynthesis were found in a few other various genera of including *Alternaria*, *Aspergillus*, *Cladosporium*, *Fusarium*, *Moncheite*, *Pistoia*, *Penicillium* isolated from yew and non-*Taxus* Plants [20,21].

Taxol as a therapeutic

Taxol is one of the effective well-known drugs for cancer treatment and it tends to be utilized in all phases of cancer spread [22]. It is used against specific tumors of lung, ovary, breast, head, and neck, inhibiting cell division and slowing down detachment of chromosomes [23,24].

Taxol Side effects

The following Taxol side effects are as follows:

- Low blood counts (decreased white and red blood cells and platelets)
- Possible anemia and/or bleeding [25].
- Arthralgias and myalgias, pain in the joints and muscles [26]
- Peripheral neuropathy
- Nausea, vomiting, diarrhea [27,28]
- Hypersensitivity reaction (hives, swelling, rashes etc) [29].

Conclusion

Thus, *Taxomyces andreanae* is a natural source of Taxol, an anticancerous drug that is widely used in therapeutics

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