

Unusually high tricin-lignin levels found in *Vanilla planifolia* aerial roots

Background

- Structural studies of lignin play an important role in understanding of its nature and biosynthesis and in realizing lignin valorization. Most lignin is composed three subunits: Syringyl, guaiacyl and hydroxyphenyl.
- The discovery of new lignin building blocks reveals new structural features indicating that plants are capable of using a wide variety of phenolic compounds during lignification.
- Vanilla seed pods had previously been found to have high levels of an unusual linear C-lignin (from caffeyl alcohol).

Approach

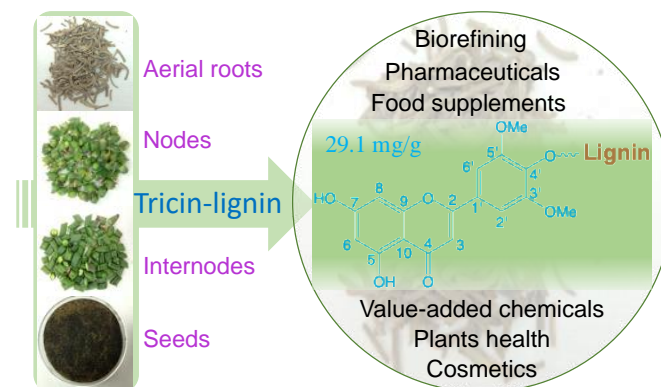
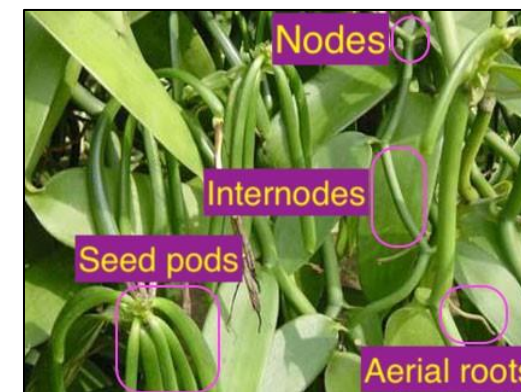
- We have investigated the structures of lignin from different tissues of vanilla (*Vanilla planifolia*), i.e., aerial roots, nodes, internodes, and seeds, by using gel permeation chromatography, heteronuclear single-quantum coherence nuclear magnetic resonance (NMR), ³¹P NMR and thioacidolysis.

Outcomes

- NMR study revealed that a high level of tricin (an aromatic flavonoid) existed in the aerial roots of vanilla, whereas the lignin from the nodes and internodes showed typical syringyl-guaiacyl type lignin with minor tricin abundance. Tricin is a flavonoid with a diaromatic structure leading to an unusual lignin.
- Thioacidolysis quantification results showed that lignin from vanilla aerial roots had about 3-5-fold higher of tricin units than the lignins isolated from nodes and internodes.

Significance

- Understanding the biosynthesis and regulation of tricin in different plant tissues could open new ways to design and engineer the structure of tricin-lignin, or lignin in general, to confer plants with new or improved properties due to the plasticity of lignification.
- The presence of the high amount of tricin as part of lignin may aid in additional approaches or uses in the valorization of lignin as a feedstock for value-added chemicals and commodities.



High amount of tricin-lignin observed from vanilla (*Vanilla planifolia*) aerial roots