Conclusions
Conclusions

- Growth independent utilization of aromatic compounds like trans-cinnamate, 4-hydroxycinnamate, 3, 4-dihydroxycinnamate, 4-hydroxybenzoate, L-phenylalanine and phenylpyruvate (Table 3) was demonstrated in *Rba. Sphaeroides* OU5.

- Toxicity of aromatic compounds on growth of *Rba. sphaeroides* OU5 analyzed as IC$_{50}$ varied depending on structure and position of functional groups on the aromatic ring.

- Inhibition of the DAHP synthase by trans-cinnamate and hydroxycinnamates indicated the possible mode of action of these compounds in inhibiting aromatic amino acid biosynthesis in *Rba. sphaeroides* OU5.

- Presence of organic molecules enhanced / suppressed growth inhibition in presence of trans-cinnamate.

- Light dependent assimilation of trans-cinnamate was demonstrated by both growing and resting cells of *Rba. sphaeroides* OU5 (Table 4).

- The process of assimilation is influenced in presence of organic molecules (Fig 34).

- In the process of assimilation, transformed products of trans-cinnamate and hydroxycinnamates were identified as phenylalanine, tryptophan, tyrosine and DOPA.

- Neither PAL nor TAL activity could be demonstrated in strain OU5.

- The enzyme catalyzing the transformation of trans-cinnamate to L-phenylalanine with intermediate phenylpyruvate was purified and characterized. This enzyme requires NADH as reducing power and ammonia as amino donor (Fig 16).

- The purified enzyme is a monomer of ~43 kD and was named as cinnamyl amino reductase.
• Transformation of trans-Cinnamate to L-tryptophan could be demonstrated in Rba. sphaeroides OU5 and a putative pathway for this transformation was proposed (Fig 35).

• 4-Hydroxybenzoate assimilation could be demonstrated in fumarate and pyruvate presence in Rba. sphaeroides OU5.

• The work on Rhodobacter sphaeroides OU5 is an update of the existing information on metabolism of aromatic compounds by this strain.

**In Summary Major Findings**

❖ trans-Cinnamate inhibits the enzyme DAHP synthase altering the *denovo* synthesis of aromatic amino acids.

❖ A novel protein of ~ 43 kDa catalyzing transformation of trans-cinnamate to L-phenylalanine was isolated and characterized.

**Future Scope**

➢ Isolated novel protein needs to be fully characterized.

➢ The genes involved in the transformation of trans-cinnamate to L-phenylalanine needs to be identified.

➢ Channeling of the trans-cinnamate into the protein synthesis needs to be established.

➢ Biosynthetic route of trans-cinnamate to L-tryptophan needs to be established in this strain.

➢ Work on 4-hydroxybenzoate needs a detail investigation.

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