This invention recognizes the rate limiting step in the pathway of carotenoid and isoprenoid production and demonstrates the utility in genetic engineering of a polynucleotide sequence to express a higher level of enzyme. This leads to the increased production of isoprenoids and carotenoids than a corresponding wild algal cell.

**MARKET**

Isoprenoids are industrially relevant and are compounds of high value with global markets in the range of USD 1 billion per annum. The global carotenoids market is estimated to be valued at USD 1.24 Billion in 2016 and projected to reach USD 1.53 Billion by 2021, at a CAGR of 3.78% from 2016 to 2021.

This invention adds incremental value to biofuel/renewable energy. The biofuels production in top and emerging countries is now expected to grow from 24,326.7 million gallons to reach 50,921.4 million gallons by 2019 at a CAGR of 9.6% from 2013 to 2019.

**APPLICATIONS**

- Isoprenoids derived from natural sources are used as nutraceuticals, anti-cancer and anti-malarial drugs, in the production of biofuels and are precursors for the synthesis of carotenoids.
- Carotenoids are pigments used in food supplements, pharmaceuticals, electro-optic applications, animal feed additives, colorants, etc.
- Biofuels are currently being used in transportation, power generation, and heat.
- The use of biofuels helps in oil price moderation.
- It plays an important role in economic security, energy security and to restrict climate change.

**ADVANTAGES**

This invention recognizes the rate limiting step in the pathway of carotenoid and isoprenoid production and demonstrates the utility in genetic engineering of a polynucleotide sequence to express a higher level of enzyme. This leads to the increased production of isoprenoids and carotenoids than a corresponding wild algal cell.

**TEAM (as during the research)**

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