

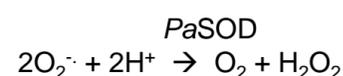


# Superoxide dismutase: an enzyme for diversified industrial application

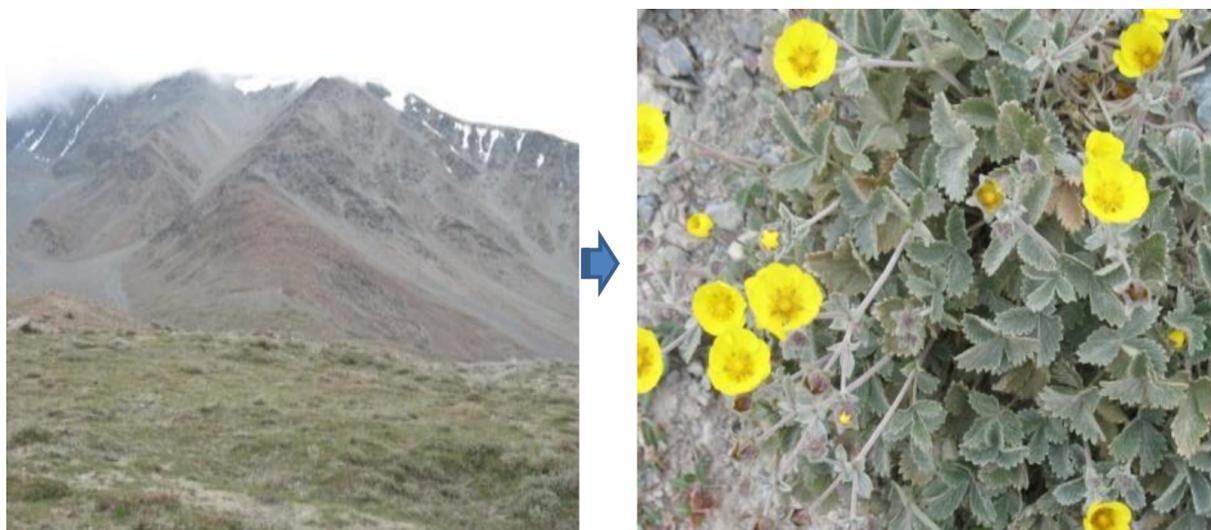
(Technology transferred to M/s. PHYTO BIOTECH PVT. LTD., BANGALORE )

## Superoxide dismutase: a way to aerobic life

Oxygen is needed for our survival and survival of plants. However, the same oxygen generates a toxic species known as superoxide radical ( $O_2^-$ ) in a number of metabolic reactions. If  $O_2^-$  is not removed, it causes lipid peroxidation, protein denaturation and DNA mutation. To protect cells and organisms, immediate removal of  $O_2^-$  is essential. Superoxide dismutase (SOD) is the enzyme that is required to scavenge  $O_2^-$  as per the following reaction



## Location and source of PaSOD



*P. atrosanguinea* at Kunzam Pass, (4500m altitude)

Closer view of *P. atrosanguinea*

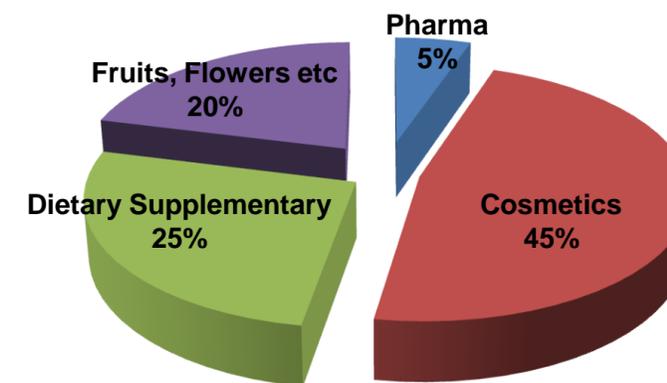
## Unique features of CSIR-IHBT PaSOD

- PaSOD tolerates autoclaving [retains~75% of the un-autoclaved activity (specific activity) as measured at 5 to 10°C]
- It functions across <0°C to >40 °C with varying activities at different assay temperatures
- Stable at room temperature

PaSOD is a protein of ~17.5 kDa, which can be visualised easily on a polyacrylamide gel popularly known as SDS-PAGE. Activity of the protein can easily be spotted by native-PAGE



Superoxide dismutase (SOD) protein



Market of SOD (Rs. 15,000 corers)

## Applications of PaSOD

Since the enzyme can be autoclaved and functions efficiently at a large temperature range including low temperatures, PaSOD can be used in the following niche areas:

**Medical Industry:** The enzyme is needed in several medical operations such as (1) during cryo-surgery, surgery, transplantation of heart, kidney, skin, liver, lung, and pancreas etc., (2) storage of cornea/lens, (3), in extending the shelf life of organelles, cells even at low temperature, (4) treatment of asthma, rheumatoid arthritis, wounding and burning of tissue and so on.

**Cosmetic Industry:** To be included in creams, shampoo and lotion etc.

**Food Industry:** For the storage of processed and un-processed food items such as cream, milk, packed vegetables, packed meat, packed chicken and other items pertaining to industry

**Plant Industry:** Plants do require it to protect against stress situations of drought, low/high temperature and so on.

## Related patents

Kumar, S., Sahoo, R. and Ahuja, P. S. 26 Nov., 2002. A novel isozyme of autoclavable SOD: a process for the identification and extraction of the SOD and use of the said SOD in the cosmetic, food and pharmaceutical composition. US Patents 6,485,950.

Arun Kumar, Som Dutt, Paramvir Singh Ahuja, and Sanjay Kumar. An autoclave stable recombinant Cu/Zn superoxide dismutase with enhanced thermoflexibility (NF0050/2011). Filed via application number 1031del 2011 dated 11.4.2011.

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