

# The Role of Parry Organic Spirulina in Radiation Protection

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## Introduction

Reactive oxygen species (ROS) can be generated in a biological system by processes such as irradiation. These affect various systems like digestive, haematopietic, immune etc. Defense mechanisms include antioxidant enzymes such as super oxide dismutase (SOD), glutathione peroxidase (GPx) and catalase, as well as the non-enzymatic antioxidants like beta-carotene, glutathione, vitamin E etc.

Radiation protection offered by Spirulina may be due to the phytopigments (carotenoids, chlorophyll, phycocyanin) as well as polysaccharides.

Spirulina can elevate the activity of all the antioxidant related enzymes viz., superoxide dismutase, catalase, glutathione peroxidase and glutathione reductase significantly [1]. **The effect may be due to the high phytopigments (carotenoids, chlorophyll, phycocyanin) in Spirulina.**

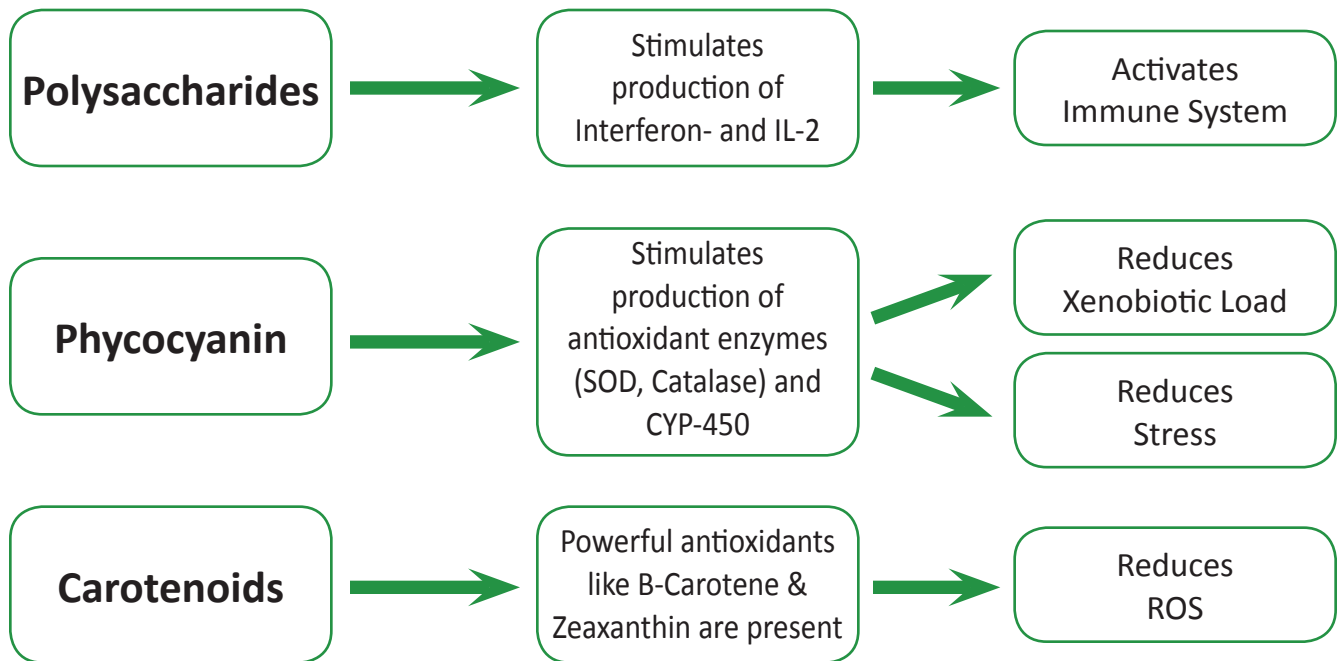
Phycocyanin is a biliprotein pigment of the blue-green algae like Spirulina with a variety of pharmacological properties, such as antioxidant [2], anti-inflammatory [2], neuro- and hepato-protective [2], and anti-tumour activities [3,4,5]. Phycocyanin stimulates the antioxidant enzymatic defense systems to modulate the early radiation response. Therefore, phycocyanin may be of interest in the radioprotection of subjects exposed to low doses of radiation [6].

In an animal study, Spirulina was shown to modulate radiation induced hematological and biochemical alterations. Swiss Albino mice were exposed to gamma radiation (8Gy). The average hemoglobin, total erythrocyte count and total leucocyte count were elevated in the group receiving Spirulina. Treatment with Spirulina also caused a significant decrease in malonaldehyde (MDA) formation in the liver, suggesting its role in protection against radiation induced membrane and cellular damage [7].

Immune cells are known to be highly radiosensitive and are considered a good indicator for the biological effects of ionizing radiation at the molecular level. Spirulina was shown to correct the immune cell parameters in a study with children exposed to prolonged low dose radiation in Chernobyl. In all the children an increase in T-lymphocytes and T-helper cells was seen, and T-suppressor cells were normalized. IgA levels became normal. [8].

Immunoglobulin E (IgE) of children living in highly radioactive areas is greatly above normal [8]. Spirulina can normalize the IgE production by reducing IL-4 levels [9].

Ionizing radiation can cause mutations in the bone marrow cells. Spirulina polysaccharide was shown to reduce mutagenesis in animal studies [10, 11]. Radiation response causes Hematopoietic syndrome, which is marked by a drop in blood cells which results in infections due to low white blood cells, bleeding due to low platelets, and anemia due to low red blood cells. Spirulina activates haematopoietic system and can help with these symptoms [11].



Parry Organic Spirulina contains high concentration of all phytopigments like carotenoids, chlorophyll and phycocyanin.

### Parry Organic Spirulina (*Arthrospira platensis*) Phytopigments mg / 100g

Total Carotenoids	400 – 650
Beta Carotene	150 – 250
Xanthophylls	250 – 470
Zeaxanthin*	125 – 200*
Chlorophyll	1300 – 1700
Phycocyanin	16000 – 20000
Polysaccharides	8000 – 10000

\* Zeaxanthin: Some producers and analytical laboratories report  
Total Carotenoid values as zeaxanthin values

	Units / 100g
ORAC (µmole TE)	24,400
Superoxide Dismutase	392,000

Parry Organic Spirulina is produced as per USDA NOP norms and also meets private organic standards like Naturland (Germany), Ecocert (France) and OCIA (USA).

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