

## LIVELIHOOD IMPROVEMENT THROUGH INDUSTRIAL HEMP (*CANNABIS SATIVA* L.): A MULTIPURPOSE PLANT OF UTTARAKHAND

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### ABSTRACT

Industrial hemp (*Cannabis sativa* L., family: Cannabaceae) is a multi purpose crop valued for its fiber, food, and medicinal uses. Due to the similarities between fibre type and drug type of *Cannabis*, the production of industrial hemp was prohibited in most countries. The northern part of India are legalized for the hemp cultivation for promoting the fibre production that subsequently, strengthen the livelihood option in rural areas. The high protein content of hemp seed can be used as value added functional food, supplements and nutraceuticals. More than 500 natural compounds along with 100 phytocannabinoids have been reported from the *Cannabis* extract. These compounds have been reported for various biological activities including antimicrobial, antiviral, antioxidant, anti-inflammatory, antitumour, etc. The phytocannabinoids like Cannabidiol (CBD) and cannabigerol (CBG) is emerging as an adjunctive treatment in COVID-19. Many research and clinical trials are ongoing on the phytocannabinoids potential in particular to physiological, metabolic and immunomodulatory effect countered by SARS-CoV-2. With this multipurpose importance, hemp needs improvement in good quality traits for both the purposes as a fiber and medication. Implication of environment- friendly molecular techniques like CRISPR/Cas system might be beneficial for mass production of desirable hemp chemical like CBD and CBG with the elimination of psychoactive compound like tetrahydrocannabinol (THC).

**Keywords:** Industrial hemp, Livelihood, Phytocannabinoids, Biological activities and COVID-19.

### INTRODUCTION

*Cannabis sativa* L. is an annual, diploid ( $2n=20$ ), dioecious (male and female flower on different plant) herb belongs to family cannabaceae. It is widely distributed all over the world and commonly known as marijuana in English and bhang in Hindi (Pellati *et al.*, 2018). The taxonomic classification of *Cannabis* plant is quite difficult due to its genetic variability and chemical constituents. It was believed that cannabis is originated from Central Asia about 500 BC (McPartland *et al.*, 2000). The species is considered as most controversial plant in the human history due to its drug abuse. However, industrial hemp is a multi purpose crop for local farmers because all parts can be utilized in one or another way. More than 30,000 hemp products are manufactured globally (Singh 2018). The species is used as anaesthetic medicine to treat many diseases. Hemp cultivated easily on barren land that enrich poor soil and can flourish in limited resources like water. Due to good growth in both temperate and tropical climate, hemp is being traditionally used in making variety of items like rope, paper, clothing, sails, food etc. Commercially hemp is being used as a fiber in textile industry, paper industry and alternative to plastic (Singh 2018). Hemp possesses many bioactive compounds like cannabidiol (CBD) and cannabigerol (CBG) which have tremendous potential

as antibacterial, antifungal, antioxidant, anti-inflammatory, and antiviral activities. The species is also a topic of concern for the recent Covid-19 pandemic. Two major compound like cannabidiol (CBD) and cannabigerol (CBG) extracted from *C. sativa* have potential to regulate, the severity of the SARS-CoV2 (Deguchi *et al.*, 2020). In consideration of the importance in traditional as well as industrial application, this species should be promoted for cultivation in the local regions. The cultivation may be helpful in large scale production of desirable hemp phytochemicals like cannabidiol (CBD) and cannabigerol (CBG) compounds further useful for mankind for various purposes. The large scale cultivation of hemp in legalized regions can be a good livelihood option with simultaneous benefits in the economy of the country.

#### Psychoactive potential in *C. sativa*

The resin of *C. sativa* contains 150 different terpenes and approximately 100 different cannabinoids (Booth *et al.*, 2019). The female plant of *Cannabis* is preferred for the production of cannabinoid and secondary metabolites. Tetra hydrocannabinol (THC) is the main psychoactive constituent present in *Cannabis* which was discovered by Gaoni *et al.* (1971). THC content in different parts of *C. sativa* is presented in Table 1.

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