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Cannabis in Nepal and scopes of its re-legalization

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ABSTRACT

The inception of legalization of Cannabis in America has paved way for the extensive research on this medicinal and religious plant all over the world. Despite the long relationship of Nepalese community with Cannabis since time immemorial, where it used to be used for both medical as well as recreational purposes, its illegalization during 1970s led to significant drop in one of the major source of income for numerous household and their families thereby impacting GDP of the country. Due to the geographical diversity of Nepal with most parts covered by hills and mountains along with the fertile land of plain region, the country has been a home to many landraces of Cannabis and we believe that it has the potential to be one of the major hub of harvest of Cannabis and Cannabis derived pharmaceutical industry. In this review, we have focused on the native strains of Cannabis in Nepal which are sold in the markets all over the world legally and how the legalization of Cannabis would bring remarkable upgrade to the country reeling under low economy and would be a great boost for the country to rise above its status of developing country. Apart from this, we have also proposed the steps that have to be taken at the government level for the stepwise legalization, substantial growth of the native strains and be a major leader in the world market by the export of Cannabis and its derived products.

Keywords: Cannabis; Legalization in Nepal; Cannabis landraces in Nepal; Nepalese economy; Cannabis and Hindu Culture.

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Background

Cannabis has been a part of human civilization all around the world for various purpose until its vilification in 19th century. In the Indian subcontinent, the use of Cannabis for medical and recreational purpose can be traced as early as vedic period (Gupta, Jani, and Shah 2001) where it was considered a part of devotion for Lord Shiva to consume it in disparate forms. Even in Nepal, this magic plant was consumed widely among the people as well as the tourists until early 1970s (Shrestha,1992), but after increasing influx of hippies to the Himalayan kingdom and their widespread consumption of Cannabis led to the criticism of Nepal government, the diplomatic pressure mounted leading to the ban of Cannabis and related product in 1973. This drastically impacted already not so large economy of Nepal and brought a great loss since people had started cultivating Cannabis in large quantities not only for their personal use but also for increasing their income. In spite of being illegal for the consumption, it is still being used by the people across the country. One of the main reason being its religious binding where the plant is offered to Lord Shiva in large number of household by growing it in their backyard as a holy plant in the Hindu majority nation. Despite the illegalization, the government has not been able to eradicate the business of Cannabis

product in the market which in turn is adversely impacting the revenue that could be generated by regulating the Cannabis business.

Cannabis plants produce more than 480 types of chemicals as secondary metabolites, of these, about 100 of them are cannabinoids and rest are terpenoids and flavonoids(Pollastro, Minassi, and Fresu 2018). Cannabinoids are more studied as they are found in larger amount and has psychoactive and therapeutic effects. Of these cannabinoids, Tetrahydrocannabinoid (THC) and Cannabidiol (CBD) are of more importance as they have recreational and medical values. More studies are required to explore completely on the chemotype of this magic plant. Proper exploitation of chemical compounds from cannabis could lead to a great achievement for human welfare.

The latest research on Cannabis for medical and recreational use has led to the legalization of Cannabis in many countries around the world such as USA, Spain, Portugal etc. Nepal should learn from these countries and follow their footsteps and make an earliest effort towards its re-legalization by creating awareness among the people about the controlled use of Cannabis among themselves for the beneficial activities of Cannabis and bringing about proactive change towards the increase in the cultivation and providing suitable market for its proliferation.



Figure 1: World map with the countries with Cannabis landraces labelled green. Green labelled countries are Nepal, India, Kazakhstan, Colombia, Afghanistan, Jamaica, Lebanon, Malawi, Mexico, Morocco and Thailand

Cannabis plant species in Nepal

Nepal is one of the few countries in the world to home cannabis landraces (Figure 1). However, any government or non-government documentation on Nepali strains could not be found in the literature. Web-searches showed that several strains labelled as Nepal-origin are now sold in the legal markets of US states and Europe (Table 1). Most of these strains are either sativa or indica. One strain named as “short nepali” is reported as ruderaills/sativa/indica (Table 1). Phenotypically, sativa are taller with less branches and thinner leaves while indicas are shorter with more branches and broader leaves. Ruderaills are

shorter than indica and do not depend upon photoperiod for flowering unlike sativa and indica. The theories for the evolutionary history of these types is still debatable. There is no concrete evidence that could claim the timeline of independent co-evolution of these plants after they were branched off from a common ancestor. Some theories mention that ruderaills are ancient to indica and sativa. Moreover, Specification of the cannabis plants is still controversial; there exists monotype, two species, four species and seven species model. Both indica and sativa strains grow in Nepal, however, it is unclear which one of them is ancient for Nepal.

TABLE 1 Strains from Nepal in the world market. The data are obtained from “seed finder” website (<https://en.seedfinder.eu/>).

Strain	Breeder	Species
Afghani/Nepali	Super sativa seed club	Indica/sativa
Nepali	Indian Landrace Exchange	sativa
Nepali Blue	Mass Medical Strains	Mostly indica
Nepali Cookies	Hash Hands	Mostly indica
Nepali OG	Unknown or Legendary	Mostly indica
Nepali Queen	TGA Subcool seeds	Mostly indica
Nepali Rukum	Holy Smoke Seeds	sativa
Nepali Watermelon Hashplant	Bodhi seeds	sativa
Short Nepali	Freedom of seeds	Ruderaills/indica/sativa
Sweet Nepali	United seed banks	Mostly indica
Nepal Baba	Dr Atomic seeds	Mostly sativa
Nepal Gold	Bulk Seed Bank	Indica/sativa
Nepal Gum OG	Philosopher Seeds	Mostly sativa
Nepal Haze	ACE Sees	sativa
Nepal Highland	Cannabiogen	sativa
Nepal JAM	Variety of Cannabis	Mostly sativa
Nepal JAM * KALI China	ACE	Mostly sativa
Nepalese Kush	Flying Dutchman	indica
Nepalese Dragon	Ministry of Cannabis	Indica/sativa
Nepalese	The Real SC	sativa
Nepalese White Mountain	The Real SC	sativa
Purple Nepal	LaLa Seeds	Mostly indica

Hemp and Marijuana in Nepal

Hemp and marijuana both are widely available in Nepal and were considered sativa species. However, recent study has shown hemp genetics inclination towards indica than sativa with hemp producing more CBD and less THC while it is vice versa in marijuana (Sawler et al. 2015). The effect of binding of THC to CB1 receptor in vertebrates make it psychoactive while CBD does not bind to CB1 receptor thus making it non psychoactive (Pertwee,2008). Although Nepal has a long history of consumption of Cannabis for medical and recreational purpose alongside using it as a raw material to produce fibrous products but still people cannot distinguish between these two varieties and collectively refer to them as "Ganja". Due to the illegalization of the plant, no extensive research has been done on the ecology and taxonomy of the plant and is still being referred to it based upon the medieval nomenclature. Along with the advancement shown by the countries all over the world, it is the need of the hour for the scientists in Nepal and the government of Nepal to show utmost importance towards the taxonomy of Cannabis and to ensure process towards scientific naming system to all the strains that are grown in Nepal

which will pave way for further research on phytochemical and extraction for efficient use of Cannabis.

It has been known since long time that the native grown Cannabis in Nepal has quite different effect on the individual and is known for increasing the concentration, bringing jovial mood in the person showing high psychoactive phenomena due to which it has attracted large number of consumer from all over the world who come seeking for marijuana due to its high THC/CBD ratio (Table 2). One of the strains "Nepali Queen" is shown to have as high 23% THC in its mature flower. Recent studies have brought up the entourage effect in medical and recreational use of cannabis (Blasco-Benito et al. 2018). Not only cannabinoids, but terpenoids are also gaining momentum in Cannabis industries and in research due to its significant effect on specific health ailments. Albeit a much reliable and official documentation of cannabinoids and terpenoids profile for Nepali strains are not available currently, if the focus can be brought upon the research on Cannabis, one can expect wide range of profiles of cannabis chemo types in Nepal due to the country being home to landraces.

TABLE 2 Strains with Nepal-origin and their potency. Data is obtained from the web portals mentioned in the source column.

Strain	THC	CBD	Source
Nepali OG	21	0.3	Hytiva
Nepalese Kush	21.8		Hytiva
Purple Nepal	16-19	0.8	Hytiva
Nepalese Dragon	17		Wikileaf
Nepalese Jam	16-18		Wikileaf
Nepali Queen	15-23	1	CannaSon
CBD Nepal Gold	6-10	6-7	Cannason
Nepal Highland	22		Weedyard

Opportunity to become a leading cannabis derived medical drugs producer

Cannabis is widely used now for its medical importance in the cure of different diseases. With the latest trend of legalization of medical Cannabis around the world, numerous

pharmaceutical companies have already been involved in the manufacture of Cannabis and its related products with different aroma, variable concentrations of THC and for multiple purposes. Even there are many shops which are established only for selling the cannabis

products where they are sold under strict government regulation to the age-restricted individual. Substantial research and studies has been conducted to understand the effect of Cannabinoids of different types and concentration on the physical and mental ability of human body and mind. For instance, THC is believed to be of great help in pain relief and also during appetite stimulation (Pacher, 2013) while CBD plays an important role in the relief from depression (Sales et al, 2018) however THC is not usually preferred for medical use due to its psychoactive effect which may cause addiction to that species of Cannabis. Similarly, cannabinoids such as CBN (Cannabinol), tetrahydrocannabivanol (THCV), Cannabigerol (CBG) has been shown to be useful in the therapeutic treatment of cancer. Of late, successful attempts has been carried out by the bio technician to produce cannabis using yeast for the large-scale production which is further going to boost the cannabinoid derived drugs study and the research (Luo et al,2019). This achievement provides the approaches to synthesize the minor cannabinoids with unknown medical benefits present in cannabis plants at large quantity. Also the publication of draft genome of *Cannabis sativa* in 2011 has paved way for the considerable genetic research and genetic engineering of the plant (van Bakel et al. 2011).

Nepal is a developing country with agriculture being its main profession and primary source of income for many household and families and is struggling to enhance its economic condition in the current scenario where its neighboring countries India and China making tremendous progress in their respective economy. With the advent of Cannabis derived drug, Nepal could use its large manpower of farmer, chemist, biologists and businessmen for the active participation in the cannabis science and industry as a result of which large number of employment can be generated which in turn will bring some degree of progress in national economy. The demand for cannabis derived

product is sure to surge in near future in the international market. If Nepal can bring change in its policies and the production of Cannabis to meet the demand of international market, it will lead to overhaul in the economy of the struggling nation with the influx of foreign currency in the country.

Discussion

Cannabis is now well known for its medical significance now but still its evolutionary history has not been completely understood and the taxonomy of strains that are available all over the world has not been documented. Nepal is known all over the world for its diverse landscapes which includes top eight highest mountains in the world, more than 80% of Nepal being covered by hills and mountains along with 17% of fertile land showing different climatic phenomenon moving from north to south. Since we know that the growth of cannabis is temperature and climate driven, cannabis plant growing in Nepal could show wide range of phenotype and chemo-type. Thus, without delay it is utmost necessary to assess the multiple strains that are growing in different parts of the country for creating databases which could be necessary for further enhancement in the quantity and quality of the available strains of Cannabis.

For broad understanding of the evolutionary history of the plant, it would be essential to do in-depth studies of the genetics of the plant, the biosynthetic pathway for cannabinoids and other secondary metabolites. Still the focus has been given only on the genetic differentiation between the different varieties of marijuana and hemp. Nepal should seriously consider the extensive research on this native grown and widespread plant for its medical and economic value by establishing separate courses in the Universities and establishing well equipped and world class research laboratories for complete assessment of the plants that are available in Nepal.

After the legalization of cannabis in Nepal, it is also the duty of the government to bring strong laws for its regulation, distribution, consumption

and the export of the cannabis derived products. Strong law enforcement will be necessary to reduce the consumption of the plant by the under-age. Government certified license should be given only to such pharmacy and dispensaries which has gone through all the rigorous training and has completely understood all the laws pertaining to sell of the plant related products. Well-equipped labs that could measure the potency and microbial contamination must be established. The government should establish great relationship with the countries that are involved in the research of the plant so that it can be useful to meet the esteemed scientist for their help in further enhancing the quality of research locally in Nepal. It is high time that government officials act urgently and take help of foreign countries if required to establish many world class laboratories in different parts of the country.

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