SUMMARY & CONCLUSION:

Dried plant part of *Cannabis*, called locally “Ganja” is one of the most common part of the plant sold in the market as well as transported illegally. However, very little studies have been done to characterize the dried plant parts on morphological basis. Present studies have been done therefore to observe the morphological characters of the dried plant parts of *Cannabis* samples, collected from all the 16 districts of Chhattisgarh, and identify the source of *Cannabis* on morphological basis. Commercial, dried part contains, stem, leaf, female inflorescence fruit and seed. These parts were observed under compound, light microscope in untreated as well as after treating with concentrated nitric acid. Nitric acid treatment was done to make the plant parts clear for microscopic observation. Glandular trichomes are the most important structure of a *Cannabis* plant, because these are the structures, which secrete the hallucinogenic substance the tetrahydrocannabinol (THC). These structures were observed to be present mainly on the bracts of the female flower. Trichomes were observed to have a multicellular stalk and a multicellular head. Cells of the stalk were arranged in several rows. Length of the glands, including the length of the stalk and head, exhibited variation from 40 i to 90 i in the samples from different districts. Samples from Dhamtari, Dantewada and Korca had the shortest length of 40 i, while the samples from Raigarh, Rajnandgaon and Surguja had the maximum length of 90 i. Thickness of the stalk of the trichomes was almost inversely proportional to the length of the stalk showing thin stalk with longer length of the stalk and vice versa. Differences in the shape and size could be one of the most important morphological structures to differentiate the samples from different places. Stem segment present in the market sold samples are clothed densely with upturned hairs. The stem hairs exhibited lesser differences in their size or shape in the samples from different places. Leaves were green to brown in colour and were always observed to be folded. Surface of the leaves showed several types of cells with respect to their size and shape. Stomata and non-glandular hairs were also observed on the leaf surface. Leaf with respect to its types of cells or with respect to other surface structures was unable to show any significant differences among the samples from different places. Xylem cells of the stem, consisting of tracheids and vessels with spiral and pitted thickenings, were almost similar in the samples from
different places. Fruit of Cannabis is achene. The wall of the fruit has beautiful architecture on its surface but not showing much differences between the samples from different places. Seed contains nucellus surrounding the embryo. Embryo had three cotyledons. Seed characters also could not differentiate the samples from different places.

From morphological characters, thus, it can be concluded that the dried plant parts of Cannabis could be cleared or could be made transparent by treating with concentrated nitric acid. This technique has so far not been applied by any of the earlier workers, working on the morphology of Cannabis. Out of different morphological structures, glandular trichomes are the best structures to differentiate the Cannabis samples grown at different samples. These observations, thus, corroborate earlier findings that the climate has significant effects on the morphological characters of Cannabis.

The drug trafficking in Chhattisgarh state depends upon the following important factors of the state:

1. Location. 2. Geography. 3. Climate. 4. Area. 5. Nature of soil & forest area. 6. Transportation.

Location:

Chhattisgarh is located in Central India. This state possesses high amount of biodiversity. The state has more than 44% of its area covered with tropical deciduous forests. The neighboring states are Uttar Pradesh, Madhya Pradesh, Jharkhand, Orissa, Andhra Pradesh and Maharashtra. The Population is 2,07,95,956 as per census of 2001.
Chhattisgarh is one of the few landlocked states in the country, Uttar Pradesh and Jharkhand being the states in the North, in the east it is bound by Orissa, in the South by Andhra Pradesh and in the West by Madhya Pradesh and Maharashtra. A large part of the state comes under Vindhyachal range.

**Climate:**

The state has tropical climate with hot summer and cold winters. Average rainfall of area is about 1600 MM. Most of the precipitation occurs during the Monsoon (Mid of June to Mid of September). Day temperature during the summers can touch a high of around 47 °C, while in the winters the temperature may fall well below 10 °C.

**Area:**

135,133,89 Kms. (4.14% of India)

The Chhattisgarh state can be divided into three regions for the data analysis of narcotic drug i.e.; North, Middle and south. The districts belonging to these regions are as under:


**Soil & Forest:**

![Figure 12: Chhattisgarh State.](60)
The red and yellow soil covers most of the part of the state. The other soil types are red loamy, red-sandy, literate and black, all of them formed in situ. Most of Bastar district is covered by red loamy and sandy soils. Literate soils are found over the south of Mainpat plateau of Surguja, the adjoining parts of Bilaspur and Durg districts and near Jagdalpur area. A deep black soil extends over the heartland of Raipur district and western part of Bilaspur and Rajnandgaon districts. The soil varies according to the topographical conditions in the region.

The state has about 44% of its area under forest cover making up of about 12% of national forest cover. The forests of the state fall under two major types i.e., Tropical Moist Deciduous forest and the Tropical Dry Deciduous forest, divisible into about 22 forest sub-types. From the management point of view, there are four types of forests, viz: Teak, Sal, Bamboo and Miscellaneous forests in the state.

**Transportation:**

Chhattisgarh state is well connected with surrounding states and rest of India by road and rail. Howrah Mumbai Main rail line passes through the state from Maharashtra to Orissa. Another rail line goes to Madhya Pradesh from Bilaspur and to Orissa and Andhra Pradesh from Raipur. Baster is also connected to Visakhapatnam by rail.

There are five national highways across the state, viz: NH G.E. road from Howrah to Mumbai, NH Raipur to Jabalpur, NH Raipur to Surguja and NH Raipur to Kota through Jagdalpur, and
Apart from national highways there are numerous state highways connecting the importing regions within the state.

Figure 15: Illicit drug trafficking trend from bordering states.

Data in last three years on narcotic cases in Chhattisgarh indicate abuse of drugs widely ganja and cultivation of cannabis (97%). Few cases have been observed that of illicit trafficking of opium (0.13%), Morphine (0.26%) and Brown sugar (2.6%).
The illicit cannabis drug trafficking is mainly observed from states like Andhra Pradesh, Orissa and Jharkhand. Most of the ganja has been seized during the transportation via road. The main consumption area of the ganja is the middle region of the Chhattisgarh state. The preliminary physical appearance of the type of ganja seized and the destination of the transportation effects that Orissa and Andhra Pradesh are the main source of the cannabis trafficking. It is also appearing from the preliminary physical examination data that the longer flowering top and their method of packing for transportation i.e.; mainly in wet, brick, and rope shape ganja is either originating from Orissa or Andhra Pradesh. This is also supported by the fact that the number of samples found in preliminary physical examination for bigger flowering top is more than the shorter flowering top.

Therefore it is concluded that the Narcotic abuse in Chhattisgarh state is affected mostly by transportation of drugs by road by drug traffickers from the state of Orissa and Andhra Pradesh. Hence considering this factor, the law enforcement agencies can control drug trafficking in Chhattisgarh state by deployment of suitable man power, and enforcement units at the borders of major roads as well as link roads.

Conclusion:

Morphological characters of Cannabis sativa has been studied by many workers, but so far no one has studied the characters of the dried samples, which is used by abusers. It is important to know the source or place of the sample, from where it has originated. Cannabis sativa is, although, now grown almost all over the world, but climate has much influence upon the morphology and physiology of the plant, resulting in the development of several biotypes. General growth form of the plant depends much upon the soil and climate of the area, in which the plant is cultivated. Fibre type Cannabis sativa may change in to drug type and vice versa according to the climate, in which the plant is grown. Presently observed samples, collected from different districts of Chhattisgarh also show much variation in their morphological characters, particularly with respect to the size and shape of the glandular trichomes. A more intensive study of other morphological characters may also reveal some differences between the samples. These results thus indicate that with the help of morphological characters of the dry samples, which are sold to the users, it may be possible to identify the source of the plant from where it has originated.
Presently the investigation of cases under NDPS act is limited only to the seizure of drugs and the arrest of the accused person involved in the crime. It is necessary to look into the aspect in a more broader spectrum. The above elaborate study would help the enforcement agencies to appreciate the necessity to exercise more effective control in restricting crime.

Other government departments, such as revenue, forest and state excise also need to extend a helping hand to the enforcement agency.

All modes of transport at the state border need to be kept on strict vigil. Narcotic and Forensic cells have to be well equipped and established at all crucial places.

Electronic database of regular offenders, carriers and people involved in this illicit trade has to be created and circulated widely amongst the enforcement personnel. Implementing a scheme of quick monetary rewards for information leading to seizures of narcotics drugs shall create interest amongst the common man and shall be of great help to the enforcement agencies.

Help of all government and non-government agencies has to be taken to identify illicit cultivation of opium poppy and the wild growth of cannabis so as to eradicate the source of supply. Collaborative approach of all agencies at all levels would help to get rid of this social virus and achieve the objectives enshrined.