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1.3.2. ADDITIONAL INFORMATION REGARDING EXPERIENTIAL LEARNING THROUGH PROJECT WORK/FIELD WORK/INTERNSHIP DURING AY 2023-24

Govt. Post Graduate College

New Tehri (T.G.)
Uttarakhand

Topic – Social and Economic Anthropological Study in Village Amilda

This dissertation is a partial part of the annual examination of

M.Sc. Forth Semester

Year – 2022-24

Supervisor

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Submitted by:

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M.Sc. 4th Semester

Department of Anthropology

मृदा-परीक्षण हेतु शैक्षणिक भ्रमण

दिनांक - 14/7/23

M.Sc. IIIrd SEMESTER 2023

SN	NAME	
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02	ISHA	Isha
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दि० 14/7/23

आज दिनांक 14/7/23 को Govt PG Colleg
बौराड़ी से मात्र 07 nos सैम्पुल मृदा नमून
विश्लेषण हेतु प्राप्त किए।
(A B C D E F G)

प्रभारी
भूमि परीक्षण प्रयोगशाला
नई टिहरी (टिहरी गढ़वाल)

Academic Tour Report

B.Sc. 3rd semester Vocational Course - (Biofertilizer)

DEPARTMENT OF BOTANY
GOVT. P. G. COLLEGE NEW TEHRI

The conversation held over the phone and with the permission of the Principal, an academic tour on the topic of "Biofertilizer" under the subject of "Botany" was organized at the residence of Shri Manglanand Dabral Ji, a farmer by profession, in Jaripani village, Chamba, Tehri Garhwal. All students gathered at the college at 10:00 AM and proceeded to Jaripani village at 10:30 AM. Both Dr. Asha Dobhal and Dr. Hemlata Nautiyal (both assistant Professor's of the Botany Department) provided information on Plant Biodiversity to their respective group of students. At 12:00 PM, all students and faculty met Shri Dabral Ji at his work place . He provided training to the students on "Vermicomposting." He explained how he prepares tons of compost annually and how it is ready in 90 days when prepared in peat .He also provided information on Floriculture and Apiculture and how one can generate income throughout the year from fruits and vegetables to support their livelihood.
And the conclusion is in front of us -
One day training was held.
After that, students prepared Vermi-compost in compost pits at Government PG college New Tehri.

Dr Hemlata Nautiyal
Assistant Professor
Govt. P.G. College
New Tehri

Dr Asha Dobhal
HEAD DEPART. OF BOTANY
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उत्तरांचल

Cover page

Title of the project= *study on fuel and oil yielding plants of devprayag*

Name = *Priti*

College=*Government degree college chandrabadni naikhari,tehri garhwal*

IVR no =*202100020488*

Scholarship for Higher Education (SHE) Component under INSPIRE

Format for Project Completion Certificate

(To be filled by the Supervisor of Research Project)

1. IVR Number or Application Ref. No: 20210002048 8
2. Name of INSPIRE Scholar: Priti
3. Name of College where Scholar is studying: Govt. degree college chandrabadni, Naikhari
4. Name of University to which above College is affiliated: Sri Dev Suman Uttarakhand University, Badshahithaul
5. Bank Account Number of Scholar: 41148338208
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7. Mobile No. and Email Address of Scholar: 9520910909, Pritinautiyal2005@gmail.com
8. Title of Project: Study on oil and fuel oil plants of Devprayag
9. Broad Subject Area of Research Project:
10. Project Duration (in weeks): 7 weeks
    (Minimum 6 to 8 weeks)
11. Date of Start of Research Project: 21 May, 2023
12. Date of Completion of Research Project: 15 July, 2023
13. Supervisor Name: Dr. Asha Dobhal
14. Designation of Supervisor:
15. Affiliation of Supervisor
    (a) Department - Deptt of Botany
    (b) College - Govt. P.G. College New Tehri
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16. Major Specialization area of Supervisor: Ecology, Medicinal plants & Taxonomy.

A. Dobhal
21/7/2023

(Seal & Signature of Supervisor)

विभागाध्यक्ष / प्रभारी
वनस्पति विज्ञान विभाग
राजकीय स्नातकोत्तर महाविद्यालय
नई टिहरी (टिहरी गढ़वाल)
उत्तराखंड 249001

Date: 21/7/23

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5. Aim/Objectives:
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7. Theoretical Framework of Topic:
8. Profile of Organization/Research Lab:
9. Methodology Followed:
10. Analysis and Interpretation of Research Project:
11. Conclusion & Suggestion of Research Project:
12. Result(s) Achieved:
13. References:
14. Declaration by the Scholar: I Priti (Full name) hereby declare that the details/facts mentioned above are true to the best of my knowledge and I solely be held responsible in case of any discrepancies found in the details mentioned above.

Priti

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"THE STUDY ON OIL AND FUEL OIL PLANTS OF DEVPRAYAG AND ADJACENT AREA , TEHRI GARHWAL , UTTARAKHAND "

2022-2023

Dissertation
For the
Research project for SHE under INSPIRE
in subject botany

UNDER THE SUPERVISION OF
DR.ASHA DOBHAL
ASSISTANT PROFESSOR

SUBMITTED BY
KM.PRITI
B.sc 2 YEAR

Department of botany
Government post graduate college
New tehri, tehri garhwal, uttarakhand

INDEX

CERTIFICATE

This is to certify that **Miss Priti** has prepared the present dissertation report on"**study on oil and fuel oil plantsof devprayag and adjacent areas**" under my supervision and guidance.

I certify that the report represents the original work carried out by the candidate at this department and no part of this work has been submitted to any other University in this or any other form .

This dissertation report is for the summer research project for SHE under INSPIRE during session 2022-2023.

(Dr.Asha dobhal)

Supervisor

ACKNOWLEDGEMENT

I would like to express my deepest gratitude to my mentor **Dr.Asha Dobhal** ,HOD ,govt.pg college, newTehri for her valuable guidance, constant supervisioninspiration during the entire dissertation period till completion of report,which benefitted me a lot while doing the project on **"study on oil and fuel oil plants of devprayag and adjacent area"**

I wish to owe deep sense of gratitude to honorable members of botany department.I am also thankful to **Dr.Anupa Phonia,** HOD govt degree college chandrabadni, naikhari for her support and suggestions.
At last I am thankful to every individual who co-operated me during field survey especially the villagers.

(Km Priti)
Bsc second year

INTRODUCTION

Garhwal Himalaya is the most spectacular in its natural aspects be it landform, water sedges, green forest and floristic diversity. The large human population with diversity life styles be life's traditional and culture heritage in habiting Garhwal Himalaya has learnt to utilize natural resources and products in various ways.

Uttarakhand has a total area of 53,483 Km of which 93% is mountainous and 64% is covered by forest.

The Uttarakhand and Himalaya falls in central Himalaya region of Himalaya, is separated by river tones from the Himachal region in the west and the Kali from the Nepal in the east.

The district Tehri is bounded by district Uttarkashi from the North side, Rudraprayag and Pauri from the South side, and Dehradun from the West site. It is covered the 3642sq. km area of the state. River Yamuna separates the district from the western front to jaunsar Pragana of Dehradun white Bhagirathi region from the north of Gangotri in Uttarkashi touches the district near village Cheniyali-Nagun.

Latitude of Tehri Garhwal – 30°30 and 30°53 North

Longitude of Tehri Garhwal – 77°56 and 79°04 East

An oil is any natural, non-polar chemical substance that is a viscous liquid at ambient temp and is both **hydrophobic and lipophilic(fat loving)**. Oil have a high carbon and hydrogen content and are usually flammable and slippery.

The general definition of oil includes classes of chemical compounds that may be otherwise unrelated in structure, properties, and uses.

Oil may be animal, vegetable or petrochemical in Origen, and may be volatile or non volatile. They are used for food, fuel, lubrication and the manufacture of paints, plastics and other materials. **Specially prepared oil are used in some religious ceremonies as purifying agents**

Oil plant, any of the numerous plants, either under cultivation or growing wild, used as sources of oil. Oil plant include tree, herbaceous plat, shrub etc. vegetable oil are used principally for food (mostly as shorting, margarines, salad and cooking oil) and in the manufacture of soap, varnishes and for a variety of other industrial items. Oil is found in large amounts usually in the seed of the plants and occasionally in the fleshy part of the fruit. Seed may contain from 01% to more than 60% oil. Oil is a reserve of high - energy food for used by germinating seed and large amount of oil are associated with large amounts of protein.

Most of the important oil crops, including the castor bean, grow in tropical and semitropical areas, and in cool, temperate regions the oil crops are soybean and plants of mustard family. Cotton seed oil, the subjected of study for cost effectiveness as a biodiesel feed stock.

Plant oil are oil derived from plant sources as opposed to animal fats or petroleum. **The 1st oil deposits in India were discovered in the state of Assam.**

There are three primary types of plant oil, differing both the means of extracting the relevant parts of the plant and in the nature of the resulting oil.

1. Vegetable oil
2. Macerated oil
3. Essential

1. **Vegetable oil** - Vegetable oil are triglycendes extracted from plants. Edible vegetable oil are used in food both in cooking and as supplements. Many oil, edible and otherwise are burned as fuel, such as in oil lamps and as a substitute for petroleum based fuels.

Helianthus annuus(Sunflower) oil a common cooking oil also used to make biodiesel. **Peanut oil (groundnut oil)** is one of the first demonstration of the diesel engine in 1900. In modern vegetable oil production oil are usually extracted chemically using a solvent such as hexane. Chemical extraction is cheaper and more efficient than mechanical extraction, at a large scale, leaving only 0.5 - 0.7% of the oil in the plant solids, as compared to 06 – 14% for mechanical extraction.

2. **Macerated oil or infused oil**: - Macerated oil consist of a base oil to which parts of plant are added. Or

Macerated oil are oil to which other matter has been added such as herbs or flower. Typically the oil used is a food-grade fat-type oil. **Rose flower are treated in this way**.

3. **Essential oils**: - Essential oil also known as volatile oil and are usually derived from the non-seed parts of the plants._Chemically the essential oil are very complex. They are found in many different species of plant of various families. Essential oil are used as a perfumes, flavours, deodorants, antiseptics and pharmaceuticals. Essential oil are usually extracted by distillation and maceration. In this method used for example to extract the onion, garlic, almond essential oil, the plant material is macerated in warm water to release the volatile compounds in the plant.

Supply and demand of oil plant :- Biodiesel from oil seed plant are also an option for India's biofuel industry. Recently, Indian scientists, economists and politicians have become increasingly interested in Jatropha, a plant that grow in

and or semiand tropical region and produces seed containing between 21 to 48% oil.

Sugarcane and edible vegetable oil such as palm oil are two of the common feed stocks for biofuel production around world. According to many sources jatropha has long been used as a small-scale energy source.

In September 2008 the Indian government announced the national biofuel policy. The policy aims to blend conventional fuels with 20% biodiesel by 2017. Currently, oil seed occupy about 27mha of GCA, with soybean at 10mha and mustard and groundnut each occupying roughly 6-7mha and the remaining 3-4mha goes to all oil seed. Oil crops as the beans contain 17-18% oil, while groundnut has 40% oil and traditional mustard contain about 33% oil. Currently the world production of oil of Lemon grass is around 600 tons/annum.

India's crude oil demand in 2016-17 is estimated at 186.2 million metric tones according to a petroleum ministry group report.

Marketing and trade of oil plants:-

1. Oil and oilseed have played an important role in the Indian economy for a long time.
2. India produces a large variety of oilseed including groundnut, sunflowers etc.
3. India was the fourth largest consumer of crude oil and petroleum product in the world in 2013.
4. India is the largest producer of caster seed and oil. The country produce around 65% of the caster oil.
5. India has increased its total net oil imports from 42% of demand in 1990 to an estimated 71% in 2012.

6. The Indian oil corporation will set up two new plants in the state Uttarakhand beside doubling the capacity of its plants in Haridwar and Haldwani. The capacity of its plants from 5000 tones to 10000 tones.
7. The Assam is also an important oil producing region and contains more than 23% of the country's reserves and 92% of the production.

Study Area

Location: devprayag

Devprayag is a town and a nagar panchayat,near New Tehri city in Tehri Garhwal district in the state of Uttarakhand. It is the final one of the panch prayag of Alaknanda where it meets the Bhagirathi river and both rivers thereafter flow on as the Ganges river or ganga .

Devprayag means godly confluence in Sanskrit.It is a sacred place , the temple of raghunath ji increase the spiritual importance of the place .The Alaknanda rises at the confluence and feet of the Satopanth and Bhagirath kharak glacier in uttarakhand near the border with Tibet .

Devprayag is 70km from rishikesh. Devprayag has an average elevation of 830 metres (2723feet).

Types of forest -The forest type is moist temperate with mixed pine oak forest and the most dominant species are pinus ,quercus and buransh.

Type of soil-Different kind of soil are present at different regions ,they are

*Sandy soil-Plant communities distinct to sandy , acidic nutrient poor,oil.soil include the tropical health forest and resting as temperate pine barren.

Ultrmafic soil - plant communities distinct to soil manganese and iron rich ultramafic rock include ultramafic barrens of the application mountain.

Climate- ****In summer-*** summers are pleasant with moderately cool climate and generally last between March to june.the temprature ranges between 19°C-32°Cduring these months.

****In winter-*** The month of October marks the start of winter season.winters are extremely cool here with the temprature in between 0°C-18°C. The winter last till the February.th

****In monsoon-***It experience a heavy rainfall in the month of July to September. The rain brings freshness and rejuvenating greenery to the place.

Map of Uttarakhand

Map of tehri garhwal

REVIEW OF LITERATURE

India is one of the major oilseed grower and importer of edible oil. India's vegetable oil economy is world's fourth largest after U.S.A. China & Brazil. The oilseed accounts for 13% of the grass cropped area 3% of the gross national product and 10 % value of all agricultural commodities. National mission on oilseed and oil palm (NMOOP) envisages increase in production of vegetable oil sourced from oilseed.

Oil has been obtained from plants since to beginning of recorded history for oil burning lamps and for anointing and cooking. During the 20th Century the production of vegetable oil has grown to more than 100 billion pounds annually.

Sunflower has maximum potential for bridging the gap in the demand and the production of edible oil in the country. Its seed contain a high oil content ranging from 35-40% with some types yielding up to 50% **(Skoric** and **Marinkovic 1986)**

Earlier Fick et al (1974), Green (1980), and **Joksimovic (1999)** used simple correlation analysis to study the relationship between oil yield on one the other side. **D.C. Zimmer 1974** correlation of seed oil content in sunflower with other plant and seed characteristics.

Muralidharan (2005) correlation and path analysis in sunflower. Cotton seed oil production expanded throughout in 17th, 18th and 19th centuries. In the 1820 and 1830 Europe experienced in oil. **1899 David Wesson**, developed cotton seed oil, Wesson cooking oil. The first use of vegetable oil as fuel was in 1900.

Rapeseed oil has been grown in Canada since 1936. **A.Siva Kumar** conducted the performance of Jatropha oil as a fuel. In India Jatrohpa tree is the source of biodiesel. Soybeans oil primary source for biodiesel in the united state. **Bruwer et al.** studied the usage of sunflower seed oil as a fuel.

Betlis evaluated the performance of sunflower, safflower and rapeseed oil as a alternate fuels. **Vijaya Kumar Reddy** tested neem, cotton seed oil and their blends with diesel.

Rudolf Diesel was the first scientist who used the vegetable oil in 1900. American chemist **George Washington Carver** discovered the soybeans are the valuable source of oil.

In the 1930s and 1940s vegetable oil were used as diesel fuels from time to time, but usually only in emergency situations. In the European union (EU), biodiesel began to be promoted in the 1980s.

Nuran Nabi et al. prepared biodiesel, using neat cotton seed oil and studied the engine performance and emissions using the biodiesel. **Wagner and Peterson** reported contradictory results when using rapeseed oil as a substitute fuel. R.A. **Candeia et al.** studied the chemical structure and physical and chemical properties of biodiesel prepared from soybean oil.

Huseyin Aydin et al.(143) In the study, cotton seed and its bland (B5, B20, B75 and B100) with diesel was used as fuel in diesel engine. **Aflatuni A(2005)**, the yield and essential oil content of mint in Northern ostrobothnia.

Dhanabal SP, Manimaran S, Subburaj T. Elango K, Kumar EP, Dhanaraj SA, et al. evaluation of antimicrobial and anti-inflammatory activity of volatile oil from cupressus Drug lines, 2000, 3(1):9-12. **Sonntag N.** 1979 composition and characteristics of individual fats and oil, in **Swern D.(Ed.) Bailey's** industrial oil and fat products, 4th edition **John wiley & sons,** New York, volume-01, PP. 289-478.

The damask rose (*Rosa damascene mill*) is the most important rose species used to produce rose oil, water, concrete and absolute which are valuable and important base materials for the perfume and cosmetic industry **(Ayci et al., 2005)**. The total production of rose oil is approximately 5 metric tons with Bulgaria and Turkey being the major production followed by Morocco, Egypt, China, Russia, Iran and India.

'Noorjahan' were collected in the month of may, 2009 from an experimental field of the central institute of medicinal and aromatic plants, research centre, Purara, Uttarakhand.

Adams, R.P(2007). Identification of essential oil components by gas chromatography/ mass spectrometry, Allured publishing corp., carol stream, illinois USA.

Kovats E (1987). Compostion of essential oil. Part 7. Bulgarian oil of rose I. **Chromatogr.** 406:185-222. Vegetable oils are essential in meeting global nutritional demands and are utilized for many food and other industrial purposes (**Idouraine et al. 1996**).

Esuoso et al. (1998) reported that seed of some species of cucurbitaceae can be the edible oil sources to meet the increasing demands for vegetable oil. Pumkin seed oil has been used traditionally as medicine in many countries such as China, India, Maxico, Brazil and America. **Alfawaz, M.A. 2004**. Chemical composition and oil characteristics of pumpkin seed kernels.

Anwar, f., Anwa, T. and **Mahmood Z., 2005.** methodical characterization of rice(*Oryza sativa*) bran oil from Pakistan. Gras.Aceit. 56:125-134. **Asekun, O.T., D.S. Grierson,** and **A.J. Afolayan. 2007**. Effects of drying methods on the quality and quantity of the essential oil of *Mentha longifolia* L. Subsp. Capensis. Food Chem. 101:995-998. **Fleisher, A.** and **Z. Fleisher. 1991.** The essential oil from *Mentha longifolia* growing in the Sinai part IV.J. essent. oil Res.3:57-58. **Singh, H.P., D.R. Batish, S. Mittal, K.S. Dogra, S. Yadav,** and **R.K. Kohli. 2008.** Constituents of leaf essential oil of *Mentha longifolia from India. Chem.nat. comp. 44:528-529.*

OBJECTIVES

THE FOLLOWING OBJECTIVES ARE PROPOSED FOR THE PRESENT WORK.

1. To study the oil and fuel oil plants of the study area.
2. To study the distinguishing habit/ habitat and characteristics of the plants.
3. Listing and identification of the plants.
4. To study the economic important of oil and fuel oil plants.

METHODOLOGY

FOLLOWING METHODOLOGY WAS ADOPTED FOR THE PRESENT WORK.

1. Thorough survey of literature on oil and fuel oil plants.

2. Regular field trips to different portions of the study area were made in different seasons especially during flowering.

3. Observation were recorded on the habitat and characteristics of plants found in the region.

4. Listing of the plants was done and their identification was done with the help of teachers and local inhabitants.

5. Identification was done with the help of suitable literature and flora record book. International code of botanical nomenclature were used for generic and species name.

6. For describing the plants, necessary photographs and herbarium was prepared.

7. Compilation of vernacular name in Hindi or English was done.

8. The possible constituents were listed as per literature available.

TABLE 02:- LIST OF OIL & FUEL OIL PLANTS OF THE STUDY AREA.

SL	BOTANICAL NAME	COMMON NAME	USED PARTS	FAMILY	FL & FR
01.	*Allium cepa*	Peyaz	Fruit	Liliaceae	Apr to May
02.	*Allium Sativum*	Garlic	Fruit	Liliaceae	Apr to Jun
03.	*Brassica Compestris*	Field-mustard	Seed	Brassicaceae	Jan to Mar
04.	*Carica papaya*	Papaya	Seed	Caricaceae	Jan to Dec
05.	*Cannabis sativa*	Bhang	Seed	Cannabaceae	Jun to Sep
06.	*Cedrus deodar*	Deodar	Wood & Bark	Pinaceae	Sep to Dec
07.	*Citrus aurantifolia*	Kagzi-nimbu	Fruit	Rutaceae	Jan to Dec
08.	*Citrus reticulate*	Santra	Leaves	Rutaceae	Sep to Dec
09.	*Citrus sinensis*	Malta	Fruit	Rutaceae	Jan to Dec
10.	*Corianderum sativum*	Dhaniya	Seed	Apiaceae	Feb to Jun
11.	*Cucurbita pepo*	Pumpkin	Seed	Cucurbitaceae	Jul to Nov
12.	*Cupressus torulosa*	Suria	Leaves	Cupressaceae	Jul to Nov
13.	*Cymbopogon citrates*	Lemongrass	Leaves	Poaceae	Jan to Sep
14.	*Emblica officinalis*	Anwala	Seed	Phyllanthaceae	Feb to Nov
15.	*Glycine max*	Soyabean	Seed	Fabaceae	Aug to Dec

16.	*Gossypium arboretum*	Wild cotton	Seed	Malvaceae	Jan to May
17.	*Hibiscus cannabinus*	Gudhal	Flower & Leaf	Malvaceae	Sep to Dec
18.	*Jatropha curcas*	Jangli-arandi	Seed	Euphorbiaceae	Feb to Oct
19.	*Juglans regia*	Akhrot	Fruit	Juglandaceae	Mar to Oct
20.	*Malus domestica*	Apple	Fruit & Seed	Rosaceae	Mar to Jul
21.	*Mangifera indica*	Mango	Fruit	Anacadiaceae	Dec to May
22.	*Mentha longifolia*	Horse-mint	Leaves	Lamiaceae	Apr to Jun
23.	*Mentha Piperita*	Pipermint	Leaves	Lamiaceae	Apr to Jun
24.	*Oryza sativa*	Rice	Bran	Poaceae	Jul to Oct
25.	*Osimum basilicum*	Ban-tulsi	Leaves	Lamiaceae	Apr to Jul
26.	*Osimum samctum*	Tulsi	Leaves	Lamiaceae	Apr to Jul
27.	*Perilla frutesscens*	Bhangjerra	Seed	Lamiaceae	Jul to Oct
28	*Pyrus pyrifolia*	Nashpati	Fruit	Rosaceae	May to Jul
29	*Pinus roxburghii*	Chir-pine	Needle & cones	Pinaceae	Mar to Jun
30.	*Pinus Wallichiana*	Blue-pine	Rasin	Pinaceae	May to Oct

31.	*Prunus armeniaca*	Chulu	Seed	Rosaceae	May to Jul
32.	*Prunus persica*	Aaru	Seed	Rosaceae	May to Jul
33.	*Punica granatum*	Darim	Seed	Lythraceae	Apr to Dec
34.	*Quercus leucotrichophora*	Banj	Wood	Fagaceae	Apr to Oct
35.	*Ricinus communis*	Castor	Seed	Euphorbiaceae	Feb to Dec
36	*Sesamum orientale*	Til	Seed	Pedaliaceae	Aug to Nov
37.	*Solanum lycopersicum*	Tomato	Seed	Solanaceae	Jan to Dec
38.	*Rosa damascene*	Rose	Flower	Rosaceae	Jul to Nov
39.	*Rosa macrophylla*	Wild rose	Seed	Rosaceae	Jul to Nov
40.	*Tagetes minuta*	Genda	Leaves & Stem	Asteraceae	Sep to Dec
41.	*Tagetes patula*	Jungli Genda	Flower	Asteraceae	Sep to Dec
42.	*Triticum aestivum*	Wheat	Seed	Poaceae	Feb to May
43.	*Urtica dioica*	Kandali	Leaves & Seed	Urticaceae	Apr to Aug
44.	*Vertivaria zinanoides*	Khus	Roots	Poaceae	Jul to Sep
45.	*Zea maize*	Maize	Seed	Poaceae	Jul to Sep

TABLE 03:- LIST OF FUEL OIL PLANTS OF THE STUDY AREA.

SL	BOTANICAL NAME	COMMON NAME	USED PARTS	FAMILY	FL & FR
01.	*Brassica compestris*	Field-mustard	Seed	Brassicaceae	Jan to Mar
02.	*Cannabis sativa*	Bhang	Seed	Cannabaceae	Jun to Sep
03.	*Glycine max*	Soybean	Seed	Fabaceae	Aug to Dec
04.	*Gossypium arboreum*	Wild-cotton	Seed	Malvaceae	Jan to Apr
05.	*Jatropha curcas*	Jangli-arandi	Seed	Euphorbiaceae	Fab to Oct
06	*Oryza sativa*	Rice	Bran	Poaceae	Jul to Oct
07.	*Quercus leucotrichophora*	Banj	Wood	Fagaceae	Apr to Oct
08.	*Ricinus communis*	Castor	Seed	Euphorbiaceae	Feb to Dec
09.	*Sesamum orientale*	Til	Seed	Pedaliaceae	Aug to Nov
10.	*Triticum aestivum*	Wheat	Seed	Poaceae	Feb to May
11.	*Zea maize*	Maize	Seed	Poaceae	Jul to Sep

OBSERVATIONS

Most common species of oil and fuel oil plants of the study area are discussed as below:-

01:- ONION

Botanical Name : ***Aillum cepa*** Hook.f.
Family : **Lillaceae**
Common Name : **Peyaz**

Distribution:- Cultivated in Himalaya (1800mtr), and throughout India. Cultivated in tropical countries.

Botanical characters:-

1. An bulbous herbaceous plant up to 1.2mtr in height.
2. Outer coat is membranous.
3. Leaves cylindrical extract for groove on inner surface, hallow, up to 15cm long.
4. Bulbs yield volatile oil (0.018 to 0.04%).

Fl & Fr :- Apr to Jun

Part used:- Fruit

Chemical Composition:- The plant consist of carbohydrate, amino acid, mineral, provide basic nutritive.

Economic impotents:-

1. The oil is used in culinary preparation for flavoring soups, tables sauces, meats etc.
2. To used in various medicine, for digestive and skin disease.

02:- GARLIC

Botanical Name	:	***Allium sativum***
Family	:	**Lillaceae**
Common Name	:	**Lahusan**

Distribution:- It is cultivated as kitchen garden crop in most part of country. Cultivated to 1800mtr in Himalaya throughout India.

Botanical characters:-

1. Erect bulbous herb, bulb short, several together, enclosed in white or pinkish envelop.
2. Leaves radial, flat fleshy, 10 to 30cm long and gloubs.
3. The bulb contain alin, alition, anthocynins and essential oil.

Fl & Fr :- Apr to Jun

Part used:- Fruit

Chemical Composition:- Garlic contains 0.1-0.36% of a volatile oil and allin, allicin, ajoene, allylpropal etc.

Economic important:-

1. To used an antiseptic, antibiotic, insecticidal and pesticide.
2. Oil used as medicine in bronchial for digestive and blood disease.

03:- FIELD MUSTARD

Botanical Name	:	***Brassica Campestris***
Family	:	**Brassieaceae**
Common Name	:	**Sarson**

Distribution:- It is cultivated in the Himalayan tracts, to 2000mtr and adjacent plains, rarely met as an escape Srinagar.

Botanical characters:-

1. Mainly differs from the typical one by slender roots and annual habit.
2. Flowers yellow, pods linear.
3. Seeds are several brownish.

Fl & Fr :- Jan to Mar

Part used:- Seed

Chemical Composition:- The seed are very important source of protein-rich pastes. It contain lipids, protein, crude fiber, glucosinolates etc.

Economic important:-

1. The oil is used for cooking and burning purposes.
2. The oil cake is used as cattle feed.
3. Both the seeds and leaves have been used for medicinal purposes, treatments for chilblains.
4. Mustard oil has a high oil content for use in the production of biodiesel.

04:- PAPAYA

Botanical Name	:	***Carica papaya***
Family	:	**Caricaceae**
Common Name	:	**Papeeta**

Distribution:- Widely cultivated to 1200mtr throughout India, native of South America, cultivated in most of the tropics.

Botanical characters:-

1. Soft tree, with milky juice
2. Stem simple or rarely branched, hollow, succulent, marked with leaf scars.
3. Seeds numerous, small, turning black when mature.

Fl & Fr :- Throughout the year

Part used:- Fruit

Chemical Composition:- The fruits are rich source of protein, lipids sucrose, fatty acid.

Economic important:-

1. Fruits edible, milky juice of the fruit used in various skin ailments
2. Papaya seed oil is used in health and beauty agents.
3. Papaya oil is rich in amino acids and protein to help strengthen hair.

05:- TRUE HEMP

Botanical Name	:	***Cannabis sativa***
Family	:	**Cannabinaceae**
Common Name	:	**Bhang or Ganja**

Distribution:- Common at road side and waste places also cultivated with rainy season crops to 2300mtr, Srinagar, cultivated or naturalized in several temperate or tropical part of the worlds.

Botanical characters:-

1. Annual-perennial erect, aromatic herbs or under shrubs to 2.5mtr high, bark fibrous.
2. Leaves palmately segment, linear-lanceolate to elliptic, narrow at both ends.
3. Male flower in lax terminal panicled-cyme.
4. Female flower solitary, axillary sessile, forming leafy spikes.

Fl:- May to Aug, **& Fr :-** Aug to Oct

Part used:- Seed

Chemical Composition:- Cannabis chemical constituents include about 100 compouds responsible for its characteristic aroma. These are mainly volatile terpenes and sesquiterpenes(cannabidiol, α-Pinene, myrcene, linalool, limonene etc.

Economic important:-

1. The oil is used in the soap, paints and varnish industries.
2. It is also used as a lamp oil.

06:- DEODAR

Botanical Name	:	***Cedrus deodara***
Family	:	**Pinaceae**
Common Name	:	**Deodar**

Distribution:- Common; moist montane forest, 2000-3000mtr, associated with oaks, Pauri, Binsar GUH 8526. W. Montane Himalaya, Afghanistan to W. Nepal.

Botanical characters:-

1. Evergreen trees, 40-80mtr high, with spreding branches and drooping branchlets.
2. Leaves in dense clusters, needle-like, 2.5-4cm long.
3. Male cones cylindrical, erect, 5-12cm long.
4. Seed 5-12mm long, wings longer than seed.

Fl & Fr :- Sep to Dec

Part used:- Wood, bark, leaves

Chemical Composition:- The main components include α - terpineol (30.2%), Linadool (24.47%), Limonene (17.01%), Anethole (14.57%), Caryophyllene (3014%).

Economic important:-

1. The oil is antiseptic and used in skin diseases, sares, fever etc.
2. The heartwood yields about 2.1% of essential oil.
3. Wood-oil massaged in lumbago, rheumatic arthritis and urticaria.

07:- CITRUS

Botanical Name	:	***Citrus aurantifolia***
Family	:	**Rutaceae**
Common Name	:	**Kagzi-nimbu**

Distribution:- Common, cultivated to 1800mtr, in drier localities, Srinagar, GUH 15217. Native of Malaya-Peninsula and India.

Botanical characters:-

1. Evergreen shrub or small tree, 2-3mtr high, with strong axillary thorns, to 5mm long.
2. Branches drooping, light green when young.
3. Flower small, white or pinkish in lax axillary racemes.

Fl & Fr :- Jan to Dec

Part used:- Fruit

Chemical Composition:- It contains L-Pinene, furfural, B-pinene, n-octyl aldehyde, bernol, citral etc.

Economic important:-

1. Lime oil is chief flavoring ingredient of carbonated, non-alcoholic beverages, ice-creams etc.
2. It is mainly used in Pharmaceuticals and toilet preparation.
3. Flowers useful source of bee-forage.

08:- SANTRA

Botanical Name	:	***Citrus reticulata***
Family	:	**Rutaceae**
Common Name	:	**Santra**

Distribution:- Native to Southeastern tropical forest of China; widely grown in many parts of the world as far as California.

Botanical characters:-

1. It is an evergreen tree growing to 4.5mtr.
2. Leaves alternately arranged, 4-10cm long and gave crenulated margins.
3. Flowers small, faintly pinkish-white.
4. Fruit is up to 8cm in diameter, globose and orange in colour.

Fl & Fr :- Sep to Dec

Part used:- Leaves

Chemical Composition:- It contains energy (223kj), carbohydrates (13.34g), sugars (10.58g), dietary fiber (1.8g), fat (0.31g), protein (0.81g), vitamin C (26.7mg), calcium (37mg) etc.

Economic important:-

1. Used in abdominal distension, to enhance digestion and to reduce phlegm.
2. The dried rind of fruit is often used as a flavoring in cakes etc.
3. An essential oil obtained from leaves and young twigs is called "petitgrain oil".

09:- MALTA

Botanical Name	:	***Citrus sinensis***
Family	:	**Rutaceae**
Common Name	:	**Malta**

Distribution:- It is widely grown in sub tropical regions of India.

Botanical characters:-

1. A compact tree of 12mtr tall with stout spines.
2. Leaflets are 10cm long, elliptic to oblong-ovate.
3. Flowers are borne clusters of 1-6.
4. Fruits are globose, orange with smooth skin and solid core.

Fl & Fr :- Jan to Dec

Part used:- Fruits

Chemical Composition:- Fruit peels yield an essential oil. It contain d-limenene, decyl aldehyde, citral octyl alcohol, linalool forming acid and carpic acid. The leaves contain pinene, limonene, dipentene, aliphatic hydrocarbons, nerol and geranic acid etc.

Economic impotents:-

1. Its peel oil is used for flavoring of food products, beverages and confectionaries.
2. For pharmaceutical and oral preparations in perfumes, creams, soaps, powders, lipsticks and cleaner preparations.

10:- CORIANDRUM

Botanical Name	:	***Coriandrum sativum***
Family	:	**Apiaceae**
Common Name	:	**Dhaniya**

Distribution:- Coriandrum is a native of Mediterranean region and is widely cultivated in all tropical countries. Commonly cultivated, also met as an escape, Srinagar.

Botanical characters:-

1. Plants are annual, branched herbs
2. Leaves petiolate, reniform upper leaves ternately and finely pinnatisect.
3. Flowers white or hull purplish.
4. Fruit 3-4mm long, ovoid.

Fl:- Feb to Apr **&** **Fr :-** May to Jun

Part used:- Seed

Chemical Composition:- A dried ripe fruit contains a fat and protein, and composition of its volatile oil known as coriandrol, containing **D-linalool** (60-70%) and **hydrocarbons** (20%).

Economic important:-

1. The leaves have an aromatic, refreshing odour and are used for flavoring food.
2. The dried fruit is used as medicinal in digestive disorders.
3. Oil used for food flavoring.
4. It is also useful cold and flu.

11:- PUMPKIN

Botanical Name : *Cucurbita pepo*
Family : **Cucurbipaceae**
Common Name : **Pumpkin**

Distribution:- Cultivated throughout the subtropics and tropics, for vegetable. Occasionally cultivated, to 2000mtr Bharsar, GUH 6222.

Botanical characters:-

1. Annual, procumbent, hispid herbs.
2. Leaves with fistular petioles; reniform-suborbicular, 5(7) lobed, lobes quite prominent, cut more than halfway, pubescent on both surfaces.
3. Flowers yellow with angular pedicels.
4. Fruits large, usually furrowed, green with yellow patches.

Fl & Fr :- Jul to Nov

Part used:- Seeds

Chemical Composition:- Seeds contents of moisture, ash, crude protein, crude fat, and crude fiber.

Economic impotents:-

1. The oil is used for desserts, giving ordinary vanilla ice-cream a nutty taste.
2. Seed oil used for skin health and skin care.
3. It is also use for cooking.

12. HIMALAYAN CYPRESS

Botanical Name : ***Cupressus torulosa***
Family : **Cupressaceae**
Common Name : **Surai**

Distribution:- Common; drier montane forests, 1800-3200mtr, often associated with Silver-fir or Oak trees, Pauri, Dudhatoli forests, GUH 8881.

Botanical characters:-

1. Evergreen trees, to 40mtr high, with whorled, spreading branches and drooping branches; bark gray-brown, peeling of in long strips. I
2. Leaves opposite, appressed to branches, scale-like, triangular, 1-1.2mm long.
3. Male cone cylindrical, with opposite, decussate peltate scales; each with 2-6 pollen sacs.
4. Female cone globose, bluish, 1.5cm, composed of woody, flat-topped, rounded or angular bract-scales, separated on drying.
5. Seeds compressed with an orbicular wing.

Fl & Fr :- Jun to Nov

Part used:- Leaves

Chemical Composition:- It contains of stearic acid(16%), potassium hydroxide (0.50%), cetosteryl alcohol(5%), liquid paraffin(3.50%), petroleum jelly(3.50%) and glycerin(7%) etc.

Economic impotents:-

1. Leaf oil used in perfumery.
2. Wood used for construction and furniture.
3. Dried leaves used as incense 'Dhup'.

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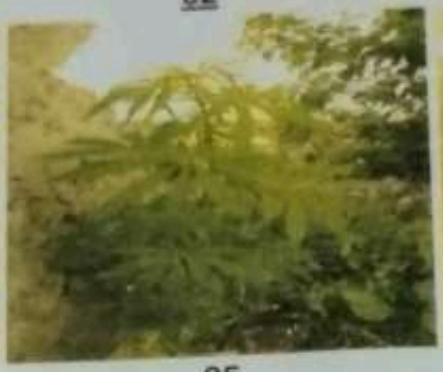

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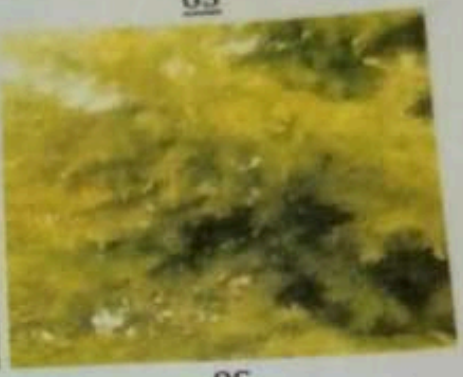

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1. *Allium cepa*, 2.*Allium sativam*, 3. *Brassica compestris*, 4. *Carica papaya*, 5. *Cannabis sativa*, 6. *Cedrus deodar*, 7. *Citrus aurantifolia*, 8. *Citrus reticulate*, 9. *Citrus sinensis*, 10. *Corianderum sativum*, 11. *Cucurbita pepo*, 12. *Cubressus torulosa*.

13:- LEMONGRASS

Botanical Name	:	***Cymbopogon flexuosus***
Family	:	**Poaceae**
Common Name	:	**Lemongrass**

Distribution:- The species is considered to have originated in India. It grows widely in many tropical and sub-tropical pars of Asia, Africa and America. In India it grown commercially in Kerala, Tamilnadu, Karnataka, Assam, Maharashtra and a part of U.P., Uttarakhand.

Botanical characters:- A herbaceous perennial grass with long, up to 2m tall, narrow and upright leaves with green colour.

Fl & Fr :- Jan to Sep

Part used:- Leaves

Chemical Composition:- Leaves yield an essential oil (03-05%) from fresh grass. It contains myrcene(0.02%), p-cymene (0.04%), b-terpineol, a-terpineol, triacetare, borneol, geraniol etc.

Economic important:-

1. Its oil mainly used in the manufacture of perfumes for soaps, hair oils, scent and medicines.
2. The oil used in certain kinds of confectionaries and liquors.
3. It is also used to improve the flavour of fishes, wines and sauces etc.

14:- ANWALA

Botanical Name	:	***Emblica officinalis***
Family	:	**Phyllanthaceae**
Common Name	:	**Anwala**

Distribution:- Common; miscellaneous and secondary scrub forest, to 2000mtr, Kotdwara, Neelkanth, throughout the warmer parts of India, Sri Lanka, Malaya-Islands and China.

Botanical characters:-

1. Deciduous trees, to 12mtr high, bark smooth, grey colour.
2. Leaves alternate, obtuse, glabrous, compound.
3. Flowers minute, greenish-yellow, in axillary clusters.
4. Fruits subglobose, pale-yellow, smooth.

Fl:- Feb to Apr **& Fr :-** Sep to Nov

Part used:- Seed

Chemical Composition:- The fruit contain high amounts of ascorbic acid.

Economic impotents:-

1. Fruit are rich source of vitamin 'C'.
2. Bark and leaves are rich source of tannin.
3. Seed used in hair oil.
4. Leaves also used as fodder.

16- SOYBEAN

Botanical Name : *Glycine max*
Family : **Fabeacea**
Common Name : **Soybean**

Distribution:- Cultivated, rarely met as escape, Sara, Srinagar.

Botanical characters:-

1. Annual, erect of suberect herbs.
2. Leaflets ovate-lanceolate, or oblong, 5-10×3-6cm, acute, base rounded.
3. Flowers 6-8mm long, violet-pink or white.
4. Seed with small scale like aril.

Fl & Fr :- Aug to Dec

Part used:- Seed

Chemical Composition:- The plant contain-protein, lipids, carbohydrates, ashes, crude fiber.

Economic important:- Seeds rich source of proteins, fats used as pulse and oil yielding resource.

16:- WILD COTTON

Botanical Name : ***Gossypium arboreum***
Family : **Malvaceae**
Common Name : **Kapas**

Distribution:- Commonly cultivated in the sub Himalayan tracts nearby temples, kitchen gardens, Kotdwara GUH 1592.

Botanical characters:-

1. Annual or perennial shrubs, to 1.5mtr high.
2. Leaves palmately 5-7 lobed, ovate-orbicular, cordate at base, petioles 1.5-12cm long.
3. Capsules across, rounded to ovoid, with 3-4mm long beak, 3-4 loculed.

Fl & Fr :- Jan to Apr

Part used:- Seed

Chemical Composition:- Its generally consists of 70% unsaturated fatty acid, 18% monounsaturated, and 52% polyunsaturated, 26% saturated fatty acid.

Economic impotents:-

1. Cotton seed oil has traditionally been used in food.
2. Oil have been used for centuries to control insect and mite pests.
3. It is also rich in Vitamin 'E', which like antioxidants, is important in fighting free-radicals.

17:- HIBISCUS

Botanical Name	:	***Hibiscus cannabinus***
Family	:	**Malvaceae**
Common Name	:	**Gudhal**

Distribution:- Common; associated with agricultural fields, to 800mtr, Srinagar, GUH 1973, native of tropical America.

Botanical characters:-

1. Annual herbs, with scattered prickles, 15-3mm tall.
2. Leaves 5-10cm across, deep palmately(3-5) lobed.
3. Flower Pale-yellow with a crimson centre, 5-10cm across.
4. Seed, brownish and hairy.

Fl & Fr :- Sep to Dec

Part used:- Seed

Chemical Composition:- Oil content 23.7% of phospholipids, palmitic acid(20.1%), oleic acid(29.2%), linoleic acid(45.9%) and stearic acid etc.

Economic impotents:-

1. Leaves and flower used for medicinal.
2. Stem yields a strong fiber.
3. Oil is often used for baldness hair growth and skin care such as eczema.

18:- JATROPHA

Botanical Name : ***Jatropha curcas***
Family : **Euphorbiaceae**
Common Name : **Jangli-Arandi**

Distribution:- Common; grown as hedge of the cultivated fields, also wild in dry exposed slopes, to 1000mtr, Kotdwara, Srinagar, GUH 8558. Native of tropical America, widely naturalized.

Botanical characters:-

1. Deciduous shrubs or small trees, to 5mtr high.
2. Young shoots glandular tomentose, with saponaceous juice; bark grey, smooth.
3. Leaves alternate, orbicular-cordate or 3-5 palmately lobed, base cordate, apex acute or obtuse.
4. Flowers yellowish-green, 6-7mm across, in terminal and subterminal, 4-12cm long.
5. Fruits oblong, 2-2.5cm long, 3-lobed, dark-brown.

Fl:- Feb to Oct **& Fr :-** Oct to Mar

Part used:- Seed

Chemical Composition:- Seed rich in crude protein(31-34.5%), Libid(55-58%), oleic acid(14.5-48.8%), linolic acid(34.6-44.4%), palmitic acid(10.5-13%) and stearic acid(2.3-2.8%).

Economic impotents:-

1. Seed oil medicinal as anthelminitic and applied externally in rheumatism as well as skin disorders.
2. The oil used for bio diesel production.

19:- AKHROT

Botanical Name : ***Juglans regia***
Family : **Juglandaceae**
Common Name : **Akhrot**

Distribution:- Commonly found in moist-shady oak-forest, Kaleshwar, Submontane and montane Himalaya, Kashmir to S.E. Tibet.

Botanical characters:-

1. Aromatic deciduous trees to 35mtr high, bark grey, longitudinally fissured.
2. Leaves alternate, imparipinnate, leaflets 7-13 sessile or sub sessile.
3. Flowers green, unisexual, female flower 1-3, clustered, opposite the terminal leaf.
4. Drupes globose or ovoid, enclosing large 2-valved, regose nut, cotyledons corrugated, oily.

Fl:- Mar to Apr **& Fr :-** Aug to Oct

Part used:- Fruit

Chemical Composition:- Root bark contains juglandic acid juglonone. Fruits contain the oxalic acid and resin. Karnils contain B group of vitamins and several mineral elements.

Economic impotents:-

1. Fruits provide oil.
2. Its oil used for skin, hair and health as well
3. Leaves mixed with stored grains as fungicide insecticide.
4. Bark used as dye and as medicine.

20:- APPLE

Botanical Name : ***Nalus domestica***
Family : **Rosaceae**
Common Name : **Apple**

Distribution:- Native to United Kingdom and much of Europe.

Botanical characters:-

1. Small tree or large branched shrub with a maximum height of 3-8mtr.
2. Leaves borne on thorn-tippedshort shoots. Long –stalked, hairless or sometimes hairy when young.
3. Flowers actinomorphic, large, fragrant; calyx-lobes 5, narrow-triangular, sharp pointed, hairy in the inner surface
4. Fruit 1-2cm, sour, green pome. Dark brown and glossy, oval, flattened seeds within a capsule surrounded by the enlarged, fleshy receptacle.

Fl & Fr :- May to Jul

Part used:- Fruit & Seed

Chemical Composition:- Fruit contains energy (52kcal), carbohydrates(13.81g), sugars(10.3g), dietary fiber (2.4g), fat(0.17g), protein(0.26g), vitamins(18%), calcium (1%), magnesium(1%), phosphorus(2%), potassium(2%) and water(85.56gm) per 100g of edible portion.

Economic impotents:-

1. Seeds are source of edible oil.
2. Oil are used for chemical thinning.
3. The wood is good for cooking fires because it burns slow and hot
4. The crushed food pulp can be used as a poultice to heal inflammations or small flesh wounds.
5. The root bark is anthelmintic, refrigerant and sorofic.

21:- MANGO

Botanical Name	:	***Mangifera indica***
Family	:	**Anacardiaceae**
Common Name	:	**Mango**

Distribution:- Cultivated as well as wild, to 1000mtr, Srinagar, Kotdwara. Cultivated throughout India and tropical countries.

Botanical characters:-

1. Evergreen trees, to 30mtr high with rough thick dark-grey bark.
2. Leaves alternate, simple, crowded at the ends of branches.
3. Flowers yellowish-green, scented, 3-4mm across, arranged in terminal panicles.

Fl & Fr :- Dec to May

Part used:- Seed

Chemical Composition:- Mango seed oil contains 5.5% palmitic acid, 40-45% stearic acid, 40-46% oleic acid, 3-4% linaleic acid etc.

Economic impotents:- Mango seed oil can be used as a substitute for cobutter in chocolate manufacturing.

22:- HORSE-MINT

Botanical Name	:	***Mentha longifolia***
Family	:	**Lamiaceae**
Common Name	:	**Paudina**

Distribution:- It found near wet, marshy places, bank of rivers, up to 2500mtr, Henwal river, Paukhal, Chakisain and Srinagar.

Botanical characters:-

1. Perennial, pubescent and aromatic herbs; stem simple or branched, stoloniferous, 4-angled, green-purple, ascending, 15-40cm high.
2. Leaves shortly petiolate, upper sessile, ovate or oblong-lanceolate, 2-3.5cm long, toothed, hairy-tomentose beneath.
3. Flowers in terminal, 2-3.5cm long.

Fl & Fr :- Apr to Jun

Part used:- Leaves

Chemical Composition:- The leaves contain resins, tannins, fixed oil, cellulose and volatile oil etc. volatile oil is a colourless, greenish-yellow liquid with characteristic odour and taste, due to ***l-carvone.***

Economic impotents:-

1. The fresh an dried leaves are used for preparing mint sauce and chutneys.
2. Leaves oil is used for flavouring food.

23:- PIPPERMINT

Botanical Name	:	***Mentha piperita***
Family	:	**Lamiaceae**
Common Name	:	**Pippermint**

Distribution:- Marshy places, water coarses, to 1600mtr, Sara, Thailisaina. Native of Europe, cultivated in several tropical countries.

Botanical characters:-

1. Perennial, erect, aromatic, glabrous herbs, simple or branched, dark purple.
2. Leaves shortly petiolate, lanceolate.
3. Flowers in thick, terminal spikes, enlarged fruiting.

Fl & Fr :- Apr to Jun

Part used:- Leaves and flower

Chemical Composition:- Flowering tops contains essential oil(03-07%). The essential oil contain carvone and menthol oil.

Economic impotents:-

1. Flower used as a source of menthol oil.
2. Used in flavouring and aromatic agent.
3. Used in confectionery, alcoholic beverages, dental creams and mouth washes.
4. Locally used in indigestion and malarial fever.

24:- RICE

Botanical Name	:	***Oryza sativa***
Family	:	**Gramineae**
Common Name	:	**Dhan, Paddy, Rice**

Distribution:- Common; cultivated, rarely met as an escape Srinagar, Binsar, GUH 2985, Cultivated throughout India to 1200mtr and tropics.

Botanical characters:-

1. Erect annuals, 30-90cm high.
2. Leaves flat, acuminate, striate, membranous, 5-8mm long.
3. Panicles spike-like, compact, ovoid-cylindrical, 20-45cm long.
4. Spikelet yellow, laterally compressed, 3-florests, 1-perfeat.

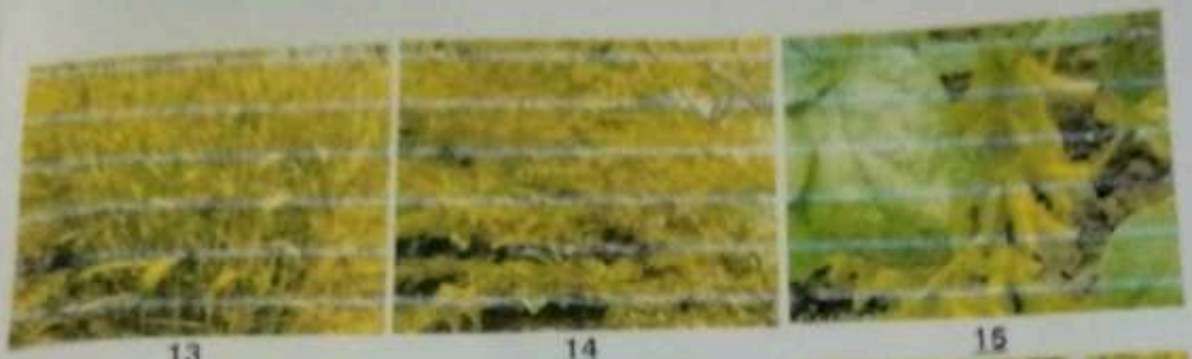
Fl & Fr :- Jul to Oct

Part used:- Bran

Chemical Composition:- Rice bran oil has contain 38% monounsaturated, 37% polyunsaturated, and 25% saturated fatty acid (palmitic acid, oleic acid etc).

Economic important:-

1. It is used as a cosmetics, confectionery, and polishing compounds.
2. It is as edible oil which is used in the preparation of vegetable ghee.



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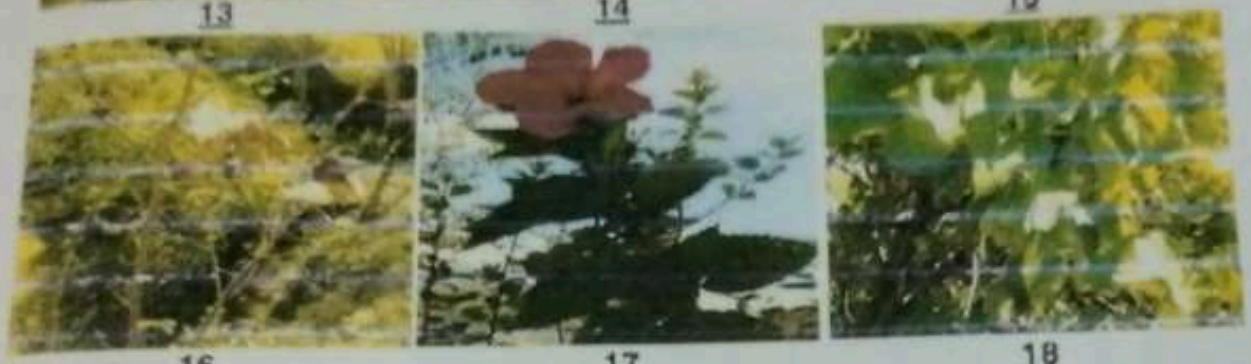

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13. *Cymbopogon citratus*, 14. *Emblica officinalis*, 15. *Glycine max*, 16. *Gossypium arboretum*, 17. *Hibiscus cannalbinus*, 18. *Jatropha curcas*, 19. *Juglans regia*, 20. *Malus domestica*, 21. *Mangifera indica*, 22. *Mentha longifolia*, 23. *Mentha piperita*, 24. *Oryza sativa*.

25:- BASIL

Botanical Name : *Ocimum basilicum*
Family : **Lamiaciae**
Common Name : **Ban Tulsi**

Distribution:- Usually cultivated nearby homyards; rarely met as an escape. rode sides or waste places.

Botanical characters:-

1. Aromatic herbs, 50-100cm long; stem usually branched from the base, hairy.
2. Leaves ovate lanceolate, 2-7×1-3cm, base cuneate or rounded.
3. Flowers purplish or whitish pink in whorls of simple or branched racemes.

Fl & Fr :- Almost throughout the year

Part used:- Leaves

Chemical Composition:- Basil contains proteins, cellulose, mineral elements, fixed oil. The organic components or the oil are methyl chavicol, d-linalool, cineole and eugenol.

Economic impotents:-

1. Oil is commonly used as flavoring in foods and beverages as a fragrance in soaps and cosmetics.
2. Oil used for a variety of health conditions.
3. Seeds are medicinal used in fever, cough and cold.

26- TULSI

Botanical Name : ***Ocimum sanctum***
Family : **Lamiaciae**
Common Name : **Tulsi**

Distribution:- It is found throughout India, ascending upto 1800mtr in the Himalayas and in the Adman and Nicobar Island.

Botanical characters:-

1. A much-branched, aromatic and erect herb.
2. Stem woody, perennial, entire, or serreat, toothed and dotted with minute glands.
3. Flowers are purples, small in terminal and closely whorls recemes.

Fl & Fr :- Almost throughout the year

Part used:- Leaves, Seeds

Chemical Composition:- Leaves and seeds yield an essential oil containing engenol, carvacrol, methyleugenol and caryopyllene.

Economic impotents:-

1. Oil is commonly used as flavoring in foods and beverages as a fragrance in soaps and cosmetics.
2. Oil used for a variety of health conditions.
3. Seeds are mucilaginous and useful in complaints of the urinary system.

27:- BHANGJEERA

Botanical Name : ***Perilla frutescens***
Family : **Lamiaceae**
Common Name : **Bhangjeera**

Distribution:- Common; waste places, crop fields, road side, occasionally cultivated, to 3000mtr, Sara, Srinagar, GUH 2008. Submontane and montane Himalaya, Myanmar, China and Japan.

Botanical characters:-

1. Annual, branched, aromatic herbs, 30-120cm high.
2. Stem 4-angled, hairy.
3. Leaves ovate-lanceolate, 6.5-13.5×3.5-8cm, base cordate, sharply toothed, acuminate and glabrous.
4. Flowers white in lax, whorled, axillary or terminal racemes; bracts lanceolate, 3-5mm long.

Fl:- Jul to Sep **& Fr :-** Sep to Oct

Part used:- Seed

Chemical Composition:- Oil seed variety contains about 38-45% lipid, 54-64% fatty acid, 14% linoleic acid and highest proportions of omega-3(α linolenic acid).

Economic impotents:-

1. The plant supplies a nutritious cooking oil from the seed, as well as giving colour and flavor to many pickled dishes.
2. Seed oil is used as a flavoring in dental products
3. Plant extract or powder of dried parts used for cough, bronchitis and uterine ailments.
4. Flowers important source of bee-forage.

28: NASHPATI

Botanical Name : ***Pyrus pyrifolia***
Family : **Rosaceae**
Common Name : **Nashpati**

Distribution:- Native to China, Japan and Korea, throughout East Asia, and in other countries such as Australia, New Zealand and the United States.

Botanical characters:-

1. It is a medium sized tree, reaching 10-17mtr tall, often with a tall, narrow crown; a few species are shrubby.
2. Leaves are alternately arranged, simple, 2-12cm long, glossy green.
3. Flowers are white, rarely tinted yellow or pink, 2-4cm diameter.
4. Fruiet is a pome 1-4cm diameter, oblate or globose to pyriform.

Fl & Fr :- May to Jul

Part used:- Fruit

Chemical Composition:- Fruit contains energy(176kj), carbohydrates(10.65gm) sugar(7.06gm), dietary fiber(3.6gm), fat(0.23gm), protein(0.5g), vitamins (13.35mg), calcium(4mg), magnesium(8mg), phosphorus(11mg), manganese (0.06mg) and potassium(121mg) per 100gm of edible portion.

Economic impotents:-

1. Oil can be used for head massage.
2. It also can be used as a hot oil treatment for the hair.
3. Oil can be used to make a facial masks for skin treatment.
4. It is a good source of dietary fiber and good source of vitamin 'C'.

29:- CHIR-PINE

Botanical Name : *Pinus roxburghii*
Family : **Pinaceae**
Common Name : **Chir-pine**

Distribution:- Abundant; in submontane to montane forests, 900-2500mtr, mostly forming pure patches, sometimes mixed, with other trees. Srinagar, Gumkhal, Thailisan, GUH 8384.

Botanical characters:-

1. Evergreen trees, to 10mtr high, bark rough, deeply fissured.
2. Leaves dark or light green, needle like.
3. Seeds 6-10mtr long, obliquely oblancealate, cotyledone 10-12mtr.

Fl & Fr :- Mar to June

Part used:- Needle, twing & cones

Chemical Composition:- Chemically, pine oil consists mainly of cyclic terpene alcohols, hydrocarbons, ethers and esters.

Economic important:-

1. It is used in aromatherapy, as a scent in both oil, as a cleaning product.
2. To used varyingly as a disinfectant, massage oil and an antiseptic.
3. It is also used as an effective organic herbicide.

30:- BLUE-PINE

Botanical Name : ***Pinus Wallichiana***
Family : **Pinaceae**
Common Name : **Blue-pine**

Distribution:- Common montane forests, 2000-3200mtr, often associated with oak forests, Pauri, Dudhaloli forests, GOH 8358.

Botanical characters:-

1. Evergreen trees, 30-45mtr high, bark smooth.
2. Leaves slender, triquetrous, bluish-green, drooping.
3. Female cones ovoid together, cylindrical, erect when young.
4. Seeds blackish, ovoid acute at both ends 5-6mm long, wings 3-4 times longer to seed.

Fl & Fr :- May to Oct

Part used:- Rasin

Chemical Composition:- Pinus wallichiana contained around 90% α-Pinene, α-Cadinol, Cubenol etc.

Economic important:-

1. The oil is used in pharmaceutical, perfumery industry.
2. The oil is valued in medicines and is included in the Indian pharmacopoeia.
3. The oil is useful in obstinate constipations.

31:- Chulu

Botanical Name : ***Prunus armeniaca***
Family : **Rosaceae**
Common Name : **Chulu**

Distribution:- A native of China, mid-Himalayas, 1100-1700mtr.

Botanical characters:-

1. Trees to 20mtr high, bark dark-brown.
2. Leaves broadly ovate or elliptic, crenate, apex acute, glabrous.
3. Flowers white, tinged with pink in centre, about 1.8-2cm fasciled.
4. Drupes pale-yellow, 2.5-3.5cm long, ovoid, glabrous.

Fl & Fr :- May to Jul

Part used:- Seeds

Chemical Composition:- It contains moisture(58.5%), pectin(2.52g), protein (0.67g), soluble solids(17.2%), acids(1.34g), phosphorus(83mg), calcium(42mg) and iron(10mg) per 100g of edible portion.

Economic impotents:-

1. Seed oil edible and also used medicinally in fever and massaged in body pain.
2. The dried fruit pulp used in local brews.
3. Flowers useful in apiculture as bee-forage.
4. It is used in opthalmia.

32:- AARU

Botanical Name : ***Prunus persica***
Family : **Rosaceae**
Common Name : **Aaru**

Distribution:- Mid Himalayas 1100-1500mtr. native of China, cultivated in Eurasia.

Botanical characters:-

1. Deciduous tree to 10mtr high, bark grey-ashy, rough, young parts pubescent.
2. Leaves lanceolate or ovate-lanceolate, closely serrate, acuminate, glabrous, petioles 1-3cm long; stipules fimbriate.
3. Flowers pinkish-white, sessile or short pedicelled, solitary.
4. Drupes succulent, downy, ovoid with 1 seeded , 1-stone: stones furrowed.

Fl & Fr :- May to Jul

Part used:- Seed

Chemical Composition:- The stem bark contains flavonone sakuranetin, flavones genkwanin, isoflavone prunetin, isoflavonone. The pulp of fruit contain moisture(68.2%), acids(1.71g), total sugars(5.20g), reducing sugars(2.40g), non-reducing(2.66g), vitamin 'C'(2.3mg) and protein(2.0%) all per 100gm. It contain total minerals(1.634g), magnesium(34mg), calcium(38mg), potassium (566mg), phosphorus (57mg), and iron (9mg) per 100gm of edible portion.

Economic impotents:-

1. Leaf extract useful to destroy insects and pests.
2. Seeds yield edible oil.
3. Its oil used for skin and hair.

33:- DARIM

Botanical Name : ***Punica granatum***
Family : **Punicaceae**
Common Name : **Darim**

Distribution:- Fairly common, wild in the sub Himalayan track to 1500mtr. Kotdwara, Dwarikhal. Cultivated throughout India, also introduced to S. Europe, N. Africa.

Botanical characters:-

1. Deciduous, shrubs or small trees, 4-10mtr high.
2. Leaves opposite, oblong, glabrous.
3. Flowers, red or orange, campanulate, 3.5-4.5cm long.
4. Ovary inferior, with many cell in two series.

Fl:- Apr to Jun **& Fr :-** Jul to Dec

Part used:- Seed

Chemical Composition:- The fruit contains moisture(69.5%) and extractable juice contains soluble solid(15.5%), acidity(5.53%), and pectin(0.06%). The edible portion contains sugars solid(10.01%), vitamin 'C'(36.62mg) per 100ml of juice, protein (2.57%), minerals contains as represented by its ash(1.491%), phosphorus(0.104%), potassium(0.473%), calcium(0.031%),magnesium(0.132%) and iron(0.0046%)respectively.

Economic impotents:-

1. Bark and fruits use in tanning and medicines.
2. Seed oil helps in reducing swelling and easing muscular aches and pains.
3. Seed oil help prevent the formation of skin cancer.

34:- BANJ

Botanical Name : *Quercus leucotrichophora*
Family : Fagaceae
Common Name : Banj

Distribution:- It is common abundant on north-East. Evergreen trees. Submontane to montane Himalaya, Garhwal to Nepal, Sri Lanka, Pakistan and Myanmar.

Botanical characters:-

1. High; 40mtr, bark pale-grey to blackish, rough.
2. Leaves ovate-lenceolate,5-11.5×2-5.5cm, Cuspidate-serrate, dark green above, densely white pubescent beneath, Slender pubescent.
3. Female flower solitary or clustered on short spikes.
4. A corns ovoid 1-1.6cm long, smooth cup covering half or more than half of nut.

Fl:- Apr to May **& Fr :-** Aug to Oct

Part used:- Wood

Chemical Composition:- It contained approximately 86.36% monoterpenoids, 6.53% sesquiterpenoids and 0.11% allphatic aldehydes.

Economic impotents:-

1. Oil used as a biodiesel production.
2. Wood oil is mostly used in perfumery.
3. Gum of the tree medicinally used for gonorrheal and digestive disorder.
4. Wood used for construction, bed, sticks as well as fuel.

25:- CASTOR

Botanical Name : ***Ricinus Communis***
Family : **Euphorbiaceae**
Common Name : **Castor bean**

Distribution:- Cultivated throughout India, ascending to 1400mtr. Srinagar, Thailisain, GUH6114.

Botanical characters:-

1. A large shrub or small tree.
2. Leaves alternate, peltate, 15-30cm long and broad.
3. Flowers yellowish-green.
4. Seeds 3, oblong, smooth, motted, carunculate.

Fl:- Feb to mar **& Fr :-** Aug to Dec

Part used:- Seed

Chemical Composition:- The plants contains linolic, alkaloids stearic, palmitic acid, sitosterol and stearic acid.

Economic impotents:-

1. The castor oil is used as a purgative.
2. It is also used for transparent soap, textile soap, perfume, paints etc.
3. Castor stem are used for strawboards and cheap wrappings.

36:- TIL

Botanical Name : ***Sesamum orientale***
Family : **Pedaliaceae**
Common Name : **Til**

Distribution:- Common cultivated, to 1500mtr, Sara, Srinagar, GUH 3918. Widely cultivated in the tropics and major parts of India, for commercial oil.

Botanical characters:-

1. Annual, erect, glandular-pubescent herbs, 32-100cm high.
2. Leaves various, lower opposite, 3-foliate or palmatisect; higher once short petioled, alternate ovate-lanceolate.
3. Flowers white or pinkish with yellow-purplish blotch, up to 3.5cm long.
4. Seeds white or black, 2-3mm long.

Fl:- Aug to Sep **& Fr :-** Oct to Nov

Part used:- Seed

Chemical Composition:- Seed contain of Palmitic acid(12%), Oleic acid(6%), Linoleic acid(50%) and Stearic acid(6%) etc.

Economic impotents:-

1. Seed oil useful in body massage.
2. Sesame oil is used in the manufacture of Ayurvedic drugs.
3. It is also used many cosmetic applications, including as a carrier oil.
4. It is also used for cooking purpose

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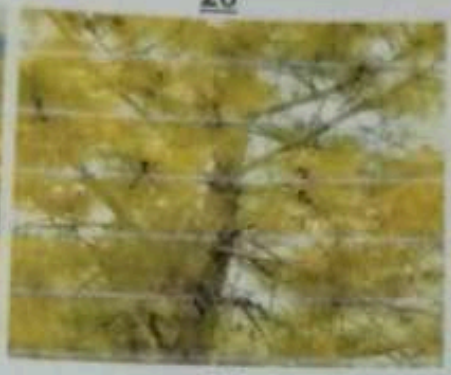

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25. *Osimum basitlcum*, 26. *Osimum sanctum*, 27. *Perilla frutesscens*, 28. *Pyrus pyrifolia*, 29. *Pinus roxburghii*, 30. *Pinus wallichiana*, 31. *Prunus armeniaca*, 32. *Prunus persica*, 33. *Punica granatum*, 34. *Quercus leucotrichophora*, 35. *Ricinus communis*, 36. *Sesamum orientale*.

32:- TOMATO

Botanical Name	:	***Solanum lycopersicon***
Family	:	**Solanacea**
Common Name	:	**Tomato**

Distribution:- Cultivated; throughout the area, to 1800mtr, occasionally met as an escape in waste places. Native of S. America, cultivated in the tropical and temperate regions.

Botanical characters:-

1. Annual, erect of decumbent-ascending herbs.
2. Stem somewhat angular or cylindrical, covered with glandular hairs.
3. Leaves lanceolate, irregularly dentate, glandular-hairy on both side.
4. Flowers yellow in 1-several flowered cymes.
5. Fruit red, smooth and grooved.

Fl & Fr :- Almost throughout the year

Part used:- Seed

Chemical Composition:- Seed contains; 8.95% moisture, 27.62% protein, 13.60% fiber, 0.56% lecithin etc.

Economic important:-

1. Tomato seed oil used in making of non-yellowing alkyds for paints.
2. In preparation of margarine.
3. In making of soaps.
4. In the preparation of salad oils.

38:- GULAB

Botanical Name : ***Rosa damascena***
Family : **Rosaceae**
Common Name : **Gulab**

Distribution:- It is native of Asia. It is commercial cultivated in Aligarh, Ghazipur and Balia district of Utter Pradesh and Udaipur district of Rajasthan.

Botanical characters:-

1. A perennial shrub attains 3mtr height.
2. Stem is covered with stout hooked falcate prickles of unequal and dilated towards the base.
3. Leaf is stipulate, compound and imparpinnate.
4. Flowers appear in groups of 5-7 and axillary terminal in corybose.
5. Flowers are sweet smelling, fragrance and blooming twice in a year.

Fl:- Jul to Aug **& Fr :-** Sep to Nov

Part used:- Flower

Chemical Composition:- Rose oil extracted from the rose petals. The aroma in flower is due to essential oil secreted in the papillae from epidermal cells the rose concrete extracted by volatile solvent petroleum ether which yield 0.25%flower concrete. The oil contains genaniol, citronellol, rose oxide, linalool, nerol, eugenol etc.

Economic impotents:-

1. Oil used in skin care product.
2. Rose oil benefits the heart as well.
3. It used to making first class perfumery.
4. It used for making syrups, medicinal preparation and also sprinkling in social functions.

39:- WILD ROSE

Botanical Name : *Rosa macrophylla*
Family : **Rosaceae**
Common Name : **Wild rose**

Distribution:- Uncommon; deforested or grassy localities, waysides of montane zones, 1500-3000mtr, Adhwani, Baijraun, Naugaonkhal, GUH 8055. Montane Himalaya, Kashmir to Sikkim, Nepal, China.

Botanical characters:-

1. Deciduous, prickly shrubs, to 3.5mtr high.
2. Leaves imparipinnate, 6-14cm long.
3. Flowers light pink or pinkish-white, 3-3.5cm across, solitary or in pairs, on glandular, 2.5-3cm long peduncles.
4. Fruits ovoid, red, glandular, 1.5-3cm long, with persistent calyx-lobes.

Fl:- Jul to Aug **& Fr :-** Sep to Nov

Part used:- Seed

Chemical Composition:- Seed oil contain α-E-acaridial(0-13.55%), hexadecanoic acid(14.26%), β-ionone(10.97%), dodecanoic acid(11.98%) and linolic acid(21.95%) etc.

Economic impotents:-

1. The oil used in cosmetics.
2. Oil used is anti-depressant, anti-septic, anti-viral, bacteridal etc.
3. Flower paste applied on skin aliments.
4. Flowers useful in apiculture as bee-forage.

40:- GENDA

Botanical Name	:	*Tagetes minuta*
Family	:	**Asteraceae**
Common Name	:	**Genda**

Distribution:- Common; road sides, waste places, margins of crop fields, sometimes in thickets reducing grassy localities, to 2000mtr, Srinagar, Rudraprayag, GUH 1216. Submontane and montane Himalaya, Garhwal to Meghalaya, recently introduced taxon from S. America.

Botanical characters:-

1. Annual, branched, aromatic herbs, 40-120cm high.
2. Leaves pinnate; leaflets linear-lanceolate, sharply, serrate, gland-dotted.
3. Heads light yellow, numerous, in crowded cymes at the end of teeth.
4. Ray florests 3-4, 2-toothed.
5. Disc florests tubular, 5-toothed.

Fl & Fr :- Sep to Dec

Part used:- Leaves & Spam

Chemical Composition:- The flower heads yield an essential oil. It contains aroma-dendrenene, tegetone, phenylethyl alcohol, ocimens, eudesmol etc.

Economic impotents:-

1. Oil used in perfumery and skin ailments.
2. Oil used antibiotic, antiparasitic, insecticide and sedative substance.
3. Oil used as a food flavoring.
4. Flower paste often applied on the wounds and cuts.

41:- JUNGLI GENDA

Botanical Name : *Tagetes patula*
Family : **Asteraceae**
Common Name : **Jungli Genda**

Distribution:- Common; wild as well as cultivated, frequent in submontane regions in thickets, reducing grassy localities, waste places, Sara, Devidanda, GUH 14146. Submontane and montane Himalaya, H.P. to Meghalaya, native of Maxico, widely distributed.

Botanical characters:-

1. Annual, erect, simple or branched, aromatic herbs, 20-60cm high.
2. Leaves upper ones alternate, pinnate or pinnatifid.
3. Flowers yellow, brown-purple or orange, 2-lobed.

Fl & Fr :- Sep to Dec

Part used:- Flowers

Chemical Composition:- The flower heads yield an essential oil. It contains aroma-dendrenene, tegetone, phenylethyl alcohol, ocimens, eudesmol etc.

Economic impotents:-

1. Oil used in perfumery and skin ailments.
2. Oil used in treatment candidias's and treating fungal infections in plant.
3. Oil used as a food flavoring.
4. Flower paste often applied on the wounds and cuts.

42:- WHEAT

Botanical Name : ***Triticum aestivum***
Family : **Gramineae**
Common Name : **Wheat, Gehun**

Distribution:- Commonly cultivated in the region, GUH7969.

Botanical characters:-

1. Annuals; culms erect, fistular, to 1mtr high, nodes glabrous.
2. Leaves linear, flat, 20-80×1cm, sheath glabrous.
3. Spikelet 3-5 flowered, hairy, 8-12mm long.
4. Glumes ovate, coriaceous, 5-7-nerved, 7-10mm long.

Fl & Fr :- Feb to May

Part used:- Seed

Chemical Composition:- Wheat oil contains fatty acid such as linoleic acid, palmitic acid, oleic acid. Wheat oil also very high in vitamin 'E'.

Economic important:-

1. To used increasing blood flow and reaction time.
2. Used treatment such as scarring and inflammation.
3. oil rich source of vitamin 'B_6' and folic acid of the vitamin 'B' complex magnesium, potassium etc.

43:- STINGING NETTLE

Botanical Name : *Urtica dioica*
Family : **Urticaceae**
Common Name : **Kandali**

Distribution:- Common; waste place, way sides, streams and river banks, to 3000mtr, Dugadda, Srinagar. Montane and Submontane, N-W Himalaya; S-W China.

Botanical characters:-

1. Perennial erect, robust herbs of shrubs, 0.5-3mtr high.
2. Stem, branches, petioles, and leaves covered with sharp, irritating stinging hairs.
3. Leaves ovate-lanceolate, 6-16×2.5-2cm, acuminate, base rounded or cordate, serrate-crenate, with stinging hairs beneath.
4. Flowers small, pale-green, male flowers with 4-perianth segments; 4-stamens.

Fl & Fr :- Apr to Aug

Part used:- Leaves, Seed

Chemical Composition:- Oil rich in chlorophyll, iron, silica and other nutrients.

Economic impotents:-

1. Leaves oil used to stop all kinds of internal and external bleeding.
2. Seed oil edible as well as medicinal in sciatica, rheumatism and several skin ailments.
3. Stem yield strong shining fiber which is used for making sacs, ropes and mats.
4. Young branches and leaves are used as delicious pot herb.

44:- VERTIVER

Botanical Name	:	***Vetiveria Zizanioides***
Family	:	**Poaceae**
Common Name	:	**Khus**

Distribution:- The grass is found throughout the plains in lower of India, particularly riverbanks and in rich marshy soils, ascending to an altitude of 1200mtr. It is propagated by slips.

Botanical characters:-

1. A large clumps from a much branched spongy rootstock with erect clumps, 0.5-1.5cm height.
2. The leaf blades are relatively stiff, long and narrow upto 75cm long and 8mm in width, glabrous, but downward rough along the edges.
3. Flowers in conical panicles, 15-30cm long, narrow, acute, appressed, awenless, sessile.

Fl & Fr :- Jul to Sep

Part used:- Roots

Chemical Composition:- Roots yields essential oil(0.2-1.0%). The major constituents are vetiverols, alpha and beta vetivones, benzoic acid and palmitic acid.

Economic impotents:-

1. Root part is cooling and essential oil acts as tonic.
2. It is aromatic, stimulant, stomachic, emmenagogus, heart-tonic, sedative and diuretic.
3. It is useful to allay thirst in fever and inflammatory affections.

45:- MAIZE

Botanical Name : ***Zea mays***
Family : **Poaceae**
Common Name : **Makai**

Distribution:- Common, cultivated to 2100mtr, Daira, Srinagar, GUH 7717.

Botanical characters:-

1. Tall annualsm, solids, thick, 0.5-2.5mtr high.
2. Leaves flat, broad, glabrous or hairy.
3. Male spikelet in terminal, 2-12×0.3cm long branches.
4. Female spikelet seated on the strong axis of the cylindrical spike, style extremely, grains subglobose.

Fl & Fr :- Jul to Sep

Part used:- Seed

Chemical Composition:- Corn contains 1.55pounds of corn oil, 80% fatty acid, 99% monounsaturated fatty acid and 98% polyunsaturated fatty acid.

Economic impotents:-

1. Maize oil has got certain advantages like easy blood circulation, reducing body fat etc.
2. This can also used be in soap manufacturing industry.

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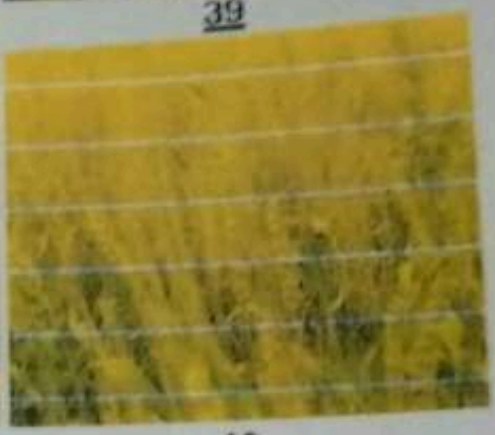

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37. *Solanum lycopersicum*, 38. *Rosa damascene*, 39. *Rosa macrothylla*, 40. *Tagetes erecta*, 41. *Tagetes patula*, 42. *Triticum aestivum*, 43. *Urtica dioica*, 44. *Vertivaria zinanoides*, 45. *Zea maize*.

Conclusion

This dissertation is an attempt to survey, collection of oil and fuel oil plants of devprayag and adjacent are for their economic values.

A total of 24 famillies of oil and fuel oil plants were identified and listed .The dominant famillies of the present study area Rosaceae, Rutaceae,and Pinaceae.

Through this study it is concluded that oil and fuel oil plants are rich source of biodiesel production of the countries .It is also rich source of vitamin ,mineral, carbohydrates,fat, protein and bioactive chemical constituents.They have lots of medicinal properties.

The oil and fuel oil plants are very important source of income for the regional people to sustain their livelihood because they are marketed in huge quantities and contribute to the economy of the region where they occur .The oil and fuel oil plants are mainly used in cooking, biodiesel,flavors, perfume, deodorant, antiseptic,and pharmaceutical.

RESULST

A total 45 numbers of locally available oil and fuel oil plants were studied during the present study belonging to the 24 families. The name of families which studied are Liliaceae, Brassicaceae, Caricaceae, Cannabiaceae, Pinaceae, Rutaceae, Apiaceae, Cucurbitaceae, Poaceae, Euphorbiaceae, Rosaceae, Lamiaceae, Urticaceae, Fagaceae, Solanaceae, Anacardiaceae, Asteraceae, Cupressaceae, Fabaceae, Juglandaceae, Lythraceae, Malvaceae and Pedaliaceae, Phyllanthaceae. Most dominating oil and fuel oil plants are, cedrus deodar, Pinus roxburghii, citrus species etc. pinaceae, Rosaceae, and rutaceae were found to dominant families of the study area.

A list of oil and fuel oil plants with botanical name, common name, families, flowering & fruiting, period is illustrated in **Table-02**, and **Table-03**. Description of each oil and fuel oil plants with photographs is also presented. Percentage distribution of different families of oil and fuel oil plants is shown in **Table-04**. Graphical presentation of different families of oil and fuel oil plants is demonstrated in **Figure-04**.

TABLE 04:- PERCENTAGE REPRESENTATION OF THE FAMILIES STUDIED.

SL.	FAMILIES	PERCENTAGE (%)
01.	Apiaceae	2.22%
02.	Anacardiaceae	2.22%
03.	Astraceae	4.44%
04.	Brassicaceae	2.22%
05.	Cannabiaceae	2.22%
06.	Caricaceae	2.22%
07.	Cucurbitaceae	2.22%
08.	Cupressaceae	2.22%

09.	Euphorbiaceae	4.44%
10.	Fabaceae	2.22%
11.	Fagaceae	2.22%
12.	Juglandaceae	2.22%
13.	Lamiaceae	11.12%
14.	Liliaceae	4.45%
15.	Lythraceae	2.22%
16.	Malvaceae	4.45%
17.	Pinaceae	6.67%
18.	Poaceae	11.12%
19.	Pedaliaceae	2.22%
20.	Phyllanthaceae	2.22%
21	Rosaceae	13.34%
22.	Rutaceae	6.67%
23.	Solanaceae	2.22%
24.	Urticaceae	2.22%

Plants part used:- The plants part used for various ailments is shown in **Table-02** and **Table-03**. The maximum number of seeds of 25 Species are used and followed by as – Roots(01species), Leaves(11 species), Stem(03 species), Flowers(03 species) and Fruits(07 species) for various ailments.

TABLE 05:- PLANTS PARTS USED IN PREPARING OIL FOR VARIOUS AILMENTS.

SL.	PARTS OF PLANTS	NO. OF OBSERVATION
01.	Roots	01
02.	Leaves	11
03	Stem	03
04.	Flower	03
05.	Fruit	07
06.	Seed	25

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14. Declaration by the Scholar: I Priti .....(Full name)
hereby declare that the details/facts mentioned above are true to the best of my knowledge and I solely be held responsible in case of any discrepancies found in the details mentioned above.

Priti
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टिहरी गढ़वाल जिले के विकासखण्ड़ चम्बा के ग्राम कुट्ठा क्षेत्र का मानव शास्त्रीय अध्ययन

प्रस्तुत प्रोजेक्ट मानव शास्त्रीय अध्ययन के एम०एस०सी० अन्तिम वर्ष की प्रयोगात्मक परीक्षा का आंशिक भाग है।

वर्ष 2021-2023

निर्देशक
डॉ० पी०सी० पैन्यूली
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उत्तराखण्ड मुक्त विश्वविद्यालय

लिखित/परियोजनाकार्य/मौखिक एवं प्रयोगात्मक परीक्षा भुगतान संबंधित बिल

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हस्ताक्षर	Ab.bhat
दिनांक	8/12/23

नोट: कृपया भुगतान हेतु विश्वविद्यालय द्वारा जारी आदेश की छायाप्रति अवश्य संलग्न करें।

केवल विश्वविद्यालय प्रयोग/सत्यापित हेतु

विश्वविद्यालय परीक्षा अनुभाग द्वारा लघु परियोजना हेतु निर्देशन/मूल्यांकन /मौखिक कार्य हेतु पारिश्रमिक का भुगतान निम्न दरों के अनुसार किया जाना प्रस्तावित है।

परियोजना कार्य पारिश्रमिक	निर्धारित दरें	कुल परियोजना कार्य संख्या	कुलपति कोष 5 %	कुल भुगतान
निर्देशन	300	01		300
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मौखिक	100	—	—	500

कुल रू0 @/500R (पांच सौ रुपए) भुगतान किया जाना है।

सत्यापित— 27/01/2024

हस्ताक्षर नाम सहित— [illegible]

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