As important honeydew source which has only been exploited for honey production is the beech *Nothofagus solandri* var. *cliffortioides* (Crane and Walker, 1985; Cook, 1981) on mountain slopes of South Island, New Zealand. The Directory of Important World Honey Sources, Crane et al. (1984) includes 14 trees solely because of their importance as sources of honeydew honey, this compares with 452 important plant sources of honey from nectar. None of the above 14 trees have flowers that produce nectar but there are 23 other plant listed as important sources of honey from nectar, which also yield honey from honeydew. Garhwal Himalaya embodies some important honeydew plant species such as *Helianthus annuus*, *Rubus* spp., *Salix* spp., *Pinus roxburghii*, and *Zea mays*, however, detailed investigations are lacking (Crane et al. 1984).

**SEASONS OF HONEY EXTRACTION**

The traditional bee keepers in the hills have two major honey flow seasons in a year, Kartik (October - November) and Baisakh (May - June). Honey is gathered by squeezing or by keeping the combs in the sun.

These two major honey seasons are alternated by two minor honey seasons in dearth periods. Although this practice is not of common occurrence in hills, yet occasionally in some localities the extraction of minor honey flow is also made, for example; Uttarkashi (S.N. 42), Gheeri (S.N. 59), Kothiyara (S.N. 60), Dangchaura (S.N. 82),
Kumola (S.N. 94), in the months of July – August, and Gheeri (S.N. 13, 14), Nathapur (S.N. 33), Tehri (S.N. 66), Khablisera (S.N. 67), Dungripanth (S.N. 75), and Srinaqar (S.N. 77) in December – February.

For such period the colonies are supported by minor bee forage as members of Acanthaceae, Brassicaceae, Lamiaceae and plant species like *Bombax*, *Rumex* in first dearth period (rainy season). During the second dearth period i.e. from December – February (winter season), the colonies are supported by members of Amaranthaceae, Brassicaceae, Poaceae and Rosaceae, and the species of *Artemisia*, *Celtis*, *Heracleum*, *Musa*, *Peristrophe*, *Rhus*, *Salix*, *Scurulla*, *Reinwardtia*, etc.

It is noted that during winters the colony work declines, flora is negligible or scanty and winter packing is required according to the altitude and severity of winters. The colonies develop well in spring and natural swarming occurs in early March to April in various localities. The period from April to mid June is of main honey flow. The rainy season is well marked from mid June to mid September. Though as mentioned earlier a few good source of nectar and pollen, and several herbs and grasses are available, but the bees seldom accomplish good work because weather does not allow them to work well and the rain washes off the nectar and pollen. Wasps and to some extent moths are the worst enemies during this season. Autumn is again a good season.
Types of Honey

Garhwal region with rich variety of flora, both wild and cultivated, and suitability of honey production at many places, produces several honey types. Based on the analysis some of the commonly occurring honeys are:

(i) Wild Honey

Honey collected from the wild nests of *Apis dorsata* is of common occurrence. The specific gravity ranges from 1.3492 - 1.4401 with an average of 1.4043 and water percentage from 17 - 25.9% (Singh, 1983). Since it is either squeezed or removed by sun heat, it contains high concentration of plant materials like pollen and other cells. As many as 21 wild samples were analysed and the major sources were found to be *Alnus nepalensis*, *Citrus* spp., *Eucalyptus* spp., *Juglans regia*, *Rubus* spp., *Rosa* spp., *Salix babylonica*, *Scurulla* spp., *Sonchus - Launaea* spp., *Symlocos paniculatus*, *Syzygiumcumini*, and some members of the Asteraceae, Brassicaceae, Lamiaceae, Myrtaceae, Rosaceae and some anemophilous and unidentified pollens.

(ii) Domestic Honey

The commonly practised apiculture by the inhabitants is based on *Apis cerana-indica*, in which the honey is either extracted by traditional method or by the modern techniques. The former is known as squeezed honey (Mauna Madhu) and the latter as extracted honey (Maunalava Madhu).
The above mentioned honeys (wild and domestic) are broadly categorised into two types.

(a) Multifloral Honeys
(b) Unifloral Honeys

(a) Multifloral Honeys

When any single source is not abundant enough, different groups of worker bees get conditioned to different floral sources and the product is multifloral honey (Nair, 1964; Deodikar et al., 1958; Deodikar, 1965; Frisch, 1969; Crane, 1973, 1975b; Maurizio, 1975; Vorwohl, 1976; Sharma, 1970a, Chaubal, 1980a, 1980b). Such multifloral honeys are also obtained during transition periods when two or more kinds of honey yielding plant species flower in succession. Multifloral honey bears distinct composition based on the locality, vegetation and season.

Summer Honey (Baisakhi Madhu)

Produced in summer (May - June) is darker in colour and comparatively thicker in consistency. The sources are wild as well as cultivated plants, like Albizzia lebbek, Alnus nepalensis, Amaranthus spp., Boerhavia diffusa, Bombax malabaricum, Brassica spp., Cannabis sativa, Celtis eriocarpa, Chrysanthemum indicum, Citrus spp., Coriandrum spp., Heracleum spp., Conyza japonica, Cyperus rotundus, Deutzia staminea, Dipsacus mitis, Echinops niveus, Eucalyptus spp., Fagopyrum esculentum,

Autumn Honey (Kartiki Madhu)

The honey extracted during October - November is considered best for its medicinal value. The important sources of this honey are species of Alnus, Amaranthus, Anaphalis, Artemisia, Bauhinia, Berberis, Brassica, Carpinus, Celtis, Chrysanthemum, Citrus, Convca, Coriandrum, Cucumis, Cucurbita Cyperus, Dicliptera, Dipsacus, Helianthus, Heracleum, Impatiens, Juglans, Leucas, Oenothera, Pinus, Primula, Prunus, Pteracanthus, Punica, Rhus, Reinwardtia, Salix, Salvia, Silene, Scurula, Sonchus - Launaea, Strobilanthes, Symplocos, Tagetes and Zizyphus and the members of Asteraceae, Lamiaceae (Salvia type) Malvaceae, Meliaceae, Moraceae, Myrtaceae, Poaceae, Polygonaccae and Rosaceae.

Multifloral honeys from north zone of U.P. have specific gravity of 1.399 (0.013) and contain water 19.98%
(1.95), total dissolved solutes 77.50% (4.64), reducing sugars 72.78% (3.28%), non reducing sugars 2.01%, and ash 0.196%, the figures in parenthesis being the standard deviation (Singh, 1983).

**Dearth Period Honey**

These two major honey flow seasons are alternated by dearth periods, the first one during rainy season and the second one during winters, when there are floral gaps and to some extent the colonies may experience the pollen and nectar shortage. During the first dearth period they are supported by a little occurrence of *Artemisia*, *Amaranthus*, *Bombax*, *Celtis*, *Eucalyptus*, *Heracleum*, *Impatiens*, *Lageneria*, *Musa*, *Peristrophe*, *Polygala*, *Rhus*, *Salix*, *Sesamum*, *Scurulla*, *Syzygium*, *Toona*, *Zea* and members of *Asteraceae*, *Lamiaceae*, *Poaceae* and *Rosaceae*.

The autumn honey harvest is followed by winter season which extends from mid November - February and the colonies live on the species of *Alnus*, *Bombax*, *Peristrophe*, *Rumex* and members of *Acanthaceae*, *Brassicaceae*, *Lamiaceae* and anemophilous group.

**Unifloral Honey**

In contrast to multifloral honeys, when honey is derived from a single plant species flowering in abundance around a colony, it is called unifloral honey. The bees
usually get conditioned to a single floral source at a
time and confine to it, as long as it is possible—a
peculiar behaviour known as 'floral fidelity'. The honey
containing 45% or more pollen derived from a single plant
species is considered to be the unifloral honey (Nair,
1964; Deodikar et al., 1958, Deodikar, 1965; Frisch, 1976;
of the unifloral honeys are:

Mustard Honey (Sample Nos. 57, 77, 83)

A number of varieties of mustard (Brassica spp.)
are grown in the area from October to January. The honey
obtained is golden yellow in colour and mild in flavour
and taste. It granulates fast. The honey indicated
moisture, 23.08%; Nitrogen, 0.023%; Ash, 0.23%; Minerals
viz., Na, 18 ppm; K, 152 ppm; Ca, 52 ppm; and reducing
sugars 62.03%.

Eucalyptus Honey (Sample Nos. 79, 96)

The honey gathered from Eucalyptus spp. is from
pale straw to dark amber coloured, depending upon the
plant species. It has good and clear body with mild
flavour and is considered to have good medicinal values.
The chemical analysis represented moisture, 15.60%;
Nitrogen 0.046%; Ash, 0.37%; Minerals viz., Na, 15 ppm;
K, 232 ppm; Ca, 38 ppm and reducing sugars, 49.38%. 
Padam Honey (Sample No. 6)

The honey is obtained from Prunus spp. especially Prunus cerasoides to have very good qualities and useful for ailments of eyes. The honey is light yellow in colour, having bitter taste and flavour. It contains moisture, 8.80%; Nitrogen, 0.022%; Ash, 0.08%; Minerals, Na, 14 ppm; K, 195 ppm and Ca, 47 ppm and reducing sugars, 63.97%.

Rubus Honey (Sample Nos. 19, 41)

The honey is gathered from a number of species of Rubus, blooming in March - May. The honey is yellow in colour, transparent, with delicious taste and pleasant flavour. The chemical composition indicated moisture, 23.82%; Nitrogen, 0.012%; Ash, 0.38%; Na-18 ppm; K-202 ppm; Ca-21 ppm; and reducing sugars, 62.99%.

Rhus Honey (Sample Nos. 35, 82)

The honey is obtained from Rhus parviflora, dull yellow in colour, watery fluid, good quality, pleasant in flavour and aroma. It contains moisture, 13.08%; Nitrogen, 0.030%; Ash, 0.36%; Na-18 ppm; K-175 ppm; Ca-68 ppm; and reducing sugars, 58.21%.

Helianthus Honey (Sample No. 50)

The honey is collected from Helianthus annuus, a staple oilseed crop. It is egg yolk yellow, dense, bearing characteristic flavour and strong aroma.
Tagetes Honey (Sample Nos. 55, 96)

The honey of *Tagetes erectus*, is red brown in colour, transparent, mild in flavour and aromatic. The chemical composition of this honey showed moisture, 9.08%; Nitrogen, 0.042%; Ash, 0.36%; Na-70 ppm; K-1575 ppm; Ca-39 ppm; and reducing sugars, 59.12%.

Alnus Honey (Sample Nos. 30, 68, 69, 95)

The single species of *Alnus, A. nepalensis* grown in this area, yields the honey. It is brick red in colour, viscous, mild in taste and pleasing in flavour. The chemical composition showed moisture, 12.81%; Nitrogen, 0.038%; Ash, 0.39%; Na-69 ppm; K-238 ppm; Ca-49.5 ppm; and reducing sugars, 62.22%.

Deutzia Honey (Sample Nos. 80, 81)

The honey is dark red brown, viscous, with sweet smell and delicious taste. Granulation is fast. The honey showed moisture, 18.20%; Nitrogen, 0.036%; Ash, 0.40; Na-36.5 ppm; K-194 ppm; Ca-51.5 ppm and reducing sugars, 54.19%.

Leucas Honey (Sample No. 85)

The honey is gathered from various species of *Leucas* blooming in the adjacent area. It is pale yellow, having unpleasant aroma with sweet delicious taste. Granulation is rapid.