



Scientific and seasonal management of *Apis mellifera* colonies

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The foraging activity of honey bees depend on the availability of bee flora and the prevailing climatic conditions, and both of these are defined for a particular season round the year *i.e.* summer, monsoon, autumn, winter and spring. The period when surplus bee flora *i.e.* source of nectar and pollen, is available for the bees to forage is known as honey flow season. In contrast, dearth period is marked by scarcity of bee flora. During extreme climatic events like scorching summer, freezing winter and monsoon, certain specific management tactics are required to maintain and safeguard the colonies in an apiary. The main aim is to prevent the colonies from collapsing, strengthen them to perform better and make beekeeping a profitable business. Beekeepers can maintain high performance level of colonies in terms of honey and other hive products by adopting suitable seasonal management tactics and maximize production. So, the basic principles behind seasonal management are: Ensuring adequate population of foragers in the hive at the right time for the collection of surplus nectar and pollen, providing space for storage of floral rewards *i.e.* nectar and pollen and ripening of nectar into honey, extracting honey from hive at the right time and strengthening and preparing the colonies to withstand any period of dearth and menace of bee enemies.

Summer management (May-June) : In northern plains, the climate starts warming up from the month of March and reaches to its peak in May-June. During this period, bees have to survive intense heat and dearth period during summer months which are marked by hot winds and air temperature often exceeding 45°C. During this harsh period, bee flora *i.e.* pollen and nectar resources often become scarce. Since drones consume heavily on stored floral resources, they are thrown out of the colonies during this period to keep these resources intact. Colony population also dwindles due to the death of old bees which have worked tirelessly throughout honey flow season. Colonies often lose strength and become vulnerable to

the attack of bee enemies like wasps, wax moth etc. Robbing activity of other bee species like *Apis cerana* and *Apis dorsata* or even *A. mellifera* bees from other colonies in the apiary is also alleviated. If colonies are not managed properly, they may even abscond or even perish to death. This tendency is more in *A. cerana* and little in *A. mellifera*. By the month of April-May, the bee activity usually attains its peak and the bee population increases tremendously. Therefore, a special care is required to maintain the colony activity to harness the main honey flow period which mainly coincides with the *berseem* bloom. Keeping that in view, it is necessary to follow various provisions in the hives and the apiary:

- Provide the bees with sufficient shade, keep the colonies under trees or an artificial structure
- Establish a source of fresh water for honey bees like a pitcher with hole or water tank or hanging pot or large pan with pebbles or stones or twigs for bees to sit on. Water let the bees to maintain their hive temperature
- Sprinkle water twice a day on gunny bag covers which are kept over the hives to reduce excess heat
- Increase ventilation by introducing a splinter between brood and super chamber so that bees do not pass through this ventilation, otherwise robbing may occur
- Plug all the cracks and crevices of boxes to prevent the intruders like natural enemies and robbers
- Do not examine the colonies very frequently. Keep 20-21 days interval for colony inspection
- Remove extra or empty or wax moth infested frames. Fumigate or smoke with sulphur and store them safely for later use
- Make sure that colonies do not remain brood less for longer duration
- Check the drone population to let the stored pollen and nectar inside the hive intact
- Use wire entrance guards and drone traps to keep away the already existing drones
- If the colonies have insufficient honey and pollen

stores provide sugar syrup and pollen supplement or substitute

Rainy season and monsoon management (July-September): Months of June to September represent the monsoon season in the sub-continent. This period is detrimental to the bees as they suffer from several problems viz., insect-pests, predators, diseases, excessive humidity and starvation. Sometimes due to continuous rains, bees can not even move outside for foraging and are confined to their hives for days. Honey bees often become lethargic and may develop dysentery. The colonies can only be kept strong with following interventions during these wet months:

- Apiary site should not be too steep or undulating and proper drainage must be there to avoid excess dampness
- Prevent colonies from rain splashes or winds
- Clean and sanitize the colonies at regular intervals say 15 days and bury deep the debris (including wax moth larvae) lying on the bottom board of the honey bee colonies
- Regularly visit apiary and check for robbing
- The hives are kept on stands (provided with oil or water pans at their bottom) to avoid ant menace
- Weak and queenless colonies should be merged with queen right colonies, since during this period due to absence of drones newly emerged queen cannot mate
- Avoid broodlessness in colonies by feeding the colonies either pollen substitute or pollen supplement or simply by pouring dried pollen directly into frame cells and sprinkling with sugared water
- Keep a check on diseases and enemies like wax moth, ants, mites and wasps
- Don't transfer frames from infected to healthy colonies
- Keep the hives on stands sloping towards entrance in order to drain out water and prevent its accumulation inside the hive.

Management during dearth period : Long dearth period *i.e.* from May-June to October-November is a major hindrance in profitable bee keeping in Haryana, but following management practices may be followed:

- Identify and plant suitable bee flora which bloom during dearth period
- Provide source of fresh water to honey bees: hanging pot or large pan with pebbles or stones or twigs for bees to sit on.
- Remove empty combs and store in air tight container
- Maintain strong queens as queenless colonies are more prone to robbing

- Dust with wheat flour or Boora powder to check robbing

- Reduce the entrance to one bee space using robber screen or paste of mud and cow dung to prevent robbing and increase defense by guard bees

- Confuse robbers by putting some branches with leaves soaked in phenol in front of hive

- Alternatively place a slanting wooden plank in front of the hive entrance to deter the entry of robber bees

- As a last resort the robber-colony should be displaced about 3 km away from the apiary

- If there is only one colony doing the robbing and one being robbed it is often sorted out by swapping places

- Don't take long while examining colonies and don't even leave frames outside for long

- Use dummy division board to confine bees to small area

- Unite weak colonies as they are prone to wax moth attack, wasps and robbing

- Provide sugar syrup, pollen supplement and substitute late in the evening hours

- During feeding, take care not to spill sugar syrup on or around hives

- Check the hives for mites, diseases, wax moth etc. and control them using sulphur dusting @ 1g/colony or formic acid @ 5g/colony or cow urine at 10 days interval

- Control the wasps using nets or place wasp trap near apiary and destroy the nearby wasp nests.

Autumn management (October to November) : This is suitable period of brood rearing and reward collection by the bees due to ambient temperature, humidity and availability of flora like sunflower, cucurbits, pigeonpea etc.

Measures to be considered during this season:

- Provision of space
- Strengthening the colonies to stimulate them for drone brood rearing
- Control of ectoparasitic mite, wax moth and wasps.

Winter (December to February) and Spring (March-April) management : In the state, winters are not so severe that may hamper brood rearing and food collection activities of honey bees. Thus, there is no problem of overwintering to *Apis mellifera*. Under Haryana conditions availability of rapeseed and mustard in winter and *Eucalyptus* and *berseem* in the spring season is best for the bees in terms of pollen and nectar abundance and availability and brood rearing. Moreover, as the colony flourishes, queen cells are formed and one can go for colony division in February. It includes the following

management tactics:

- Maintain strong and disease free colonies
 - Keep the colonies in bright sunshine with entrance facing sun
 - Keep colonies covered with gunny bags or warm clothing
 - Provision of sugar syrup (2:1) as starter to boost brood development
 - Check the hives for mites and control them using sulphur smoke or formic acid or cow urine is also being used now a days
 - If possible go for organic management of mites as use of chemical pesticides may leave residue in the honey and it will be rejected in international market
 - Plug all the cracks and crevices so that bees can maintain temperature inside the hive
 - Use wind breaks (combination of bushes, hedges etc.) to prevent colonies from chilling winds
 - Provide new queen to the hives for prolific egg laying as queen cells are formed in this season
 - Cut the new queen cells formed or go for division of strong colonies to prevent swarming
 - Insert frames or comb foundation sheet in the hives to accelerate brood rearing and storage of pollen and nectar
 - Shift honey rich frames in supers
 - Don't open the colonies too early in the morning and evening hours otherwise larvae might be killed due to cold exposure
 - Divide colonies in February taking care of strength and food stores of old and new colonies
- Honey flow season management :** During this period colonies should be quite populous but without swarming instinct and should gather maximum honey instead of only concentrating on brood rearing. Colony morale should be high for honey collection. This season coincides with late spring. During this season,
- With the first indication of honey flow, provide supers to the colonies.
 - Provide more space for honey storage by giving comb foundation sheets or built combs
 - Clip the wings of the queen by half to prevent swarming
 - Confine queen to brood chamber using queen excluder
 - When first super is full, put the second one between brood chamber and first super
 - Prevent swarming by avoiding congestion in the brood chamber

- Provide empty combs at all the times until end of honey flow
- Division of colonies also reduces the urge of swarming
- The space can be provided by removing sealed brood to super chamber
- Prior to honey flow, provide sugar syrup and build sufficient population
- Divide strong colonies into 2-3 new colonies, if colony multiplication is needed
- Queen rearing technique may be followed to produce new queens for new colonies
- Select only completely sealed honey frames, place these in an empty hive and cover with an inner cover before honey extraction
- Extract honey in a netted room to avoid bees
- Leave behind sufficient food stores within the colonies as per strength and prevailing dearth period
- Select sealed honey combs only and not frames with sealed/unsealed brood
- With the help of bee brush dislodge bees from honey combs
- Uncap the wax seals of honey comb with uncapping knife and put these uncapped honey combs into the honey extractor
- Gradually increase the speed of rotation of the honey extractor
- Immediately after extraction, filter the honey through double fold muslin cloth.

Ten commandments of colony health :

- Examine all colonies periodically
- Correct any imbalance or abnormality immediately
- Provide bees with sufficient food at all times
- Provide bees with a nearby source of fresh water at all times
- Provide bees with enough comb foundations to renew the brood nest yearly
- Provide colonies with young and improved queens, yearly
- Destroy and remove any diseased colony immediately
- Disinfect all contaminated equipment promptly and thoroughly
- Never leave old or contaminated equipment openly near your bee hives
- Never introduce bees or equipment from outside sources without proper examination and disinfection.

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