ARKANSAS
AFRICANIZED BEE ACTION PLAN

Introduction

Impact and Coordination

The steady progression of the Africanized honey bee northward from Sao Paulo, Brazil, where it escaped from a breeding program in 1957, has created tremendous problems for the beekeeping industry in South and Central America, Mexico and more recently in southern United States. In addition, because of its characteristic strong defensive behavior, the Africanized honey bee can be a significant livestock and human pest. In an effort to properly prepare for the arrival of the Africanized honey bee, an established, planned public awareness, regulatory, and research program is needed to reduce the adverse effects of this pest.

Therefore, these concerns led to the decision to form an Arkansas Africanized Honey Bee Advisory Committee. This committee will be composed of representatives of state and federal agencies, organizations and associations that would either be directly impacted or who could have a role to play in education, research, regulations, human health or management of the Africanized honey bee once it reaches Arkansas. The agencies and associations selected to be represented on the Advisory Committee are listed in Appendix A.

Relationships

This Africanized honey bee management plan was developed for the state of Arkansas to address state needs. The plan has been developed within the frame work established by the Animal and Plant Health Inspection Service (APHIS), Texas, and North Carolina plans. It is urgent that both state and federal regulatory and quarantine agencies be intimately involved in optimizing available resources and coordinating of program activities. Coordination with other state agencies and state associations will be handled through the Arkansas Africanized Honey Bee Advisory Committee.

Goals and Objectives

The primary goals of the Arkansas Africanized Honey Bee Advisory Committee are:

1. Develop a management plan that carefully outlines the strategies and plans based on the best current technology for dealing broadly with the Africanized honey bee when it arrives at our border.

2. Recommend priorities required to implement the regulatory, educational and research objectives of the Arkansas Africanized Honey Bee Management Plan.

In addition the above goals, the Advisory Committee also identified the following objectives:

1. Ensure that each agency/organization represented receives the most current and accurate information on the Africanized honey bee as it is received.

2. Ensure a coordinated effort by the represented agencies/organizations in developing and carrying out a mutually acceptable plan for dealing with the Africanized honey bee when it enters Arkansas.

3. Ensure that information released to the public is accurate and current to avoid unwarranted public concern.

4. Serve as an advisory group to the chief administrative officer of the lead agency on all facets of the Africanized honey bee problem and keep the administrator of each represented agency and organization advised of key developments.

Background

The European honey bee consisting of several races of *Apis mellifera L.*, has been "managed" by commercial and hobby beekeepers worldwide for many centuries. It has been selected by beekeepers for desirable traits - principally gentleness, honey production, tendency not to swarm, winter hardiness and others. The African honey bee, *Apis mellifera scutellata* Ruttner, on the other hand, survived through natural selection in a harsh, demanding environment in Africa where such factors as predation and climate have produced an aggressive and hardy race.

Crossbreeding and Africanization

The Africanized honey bee is technically termed a "hybrid swarm" which resulted from the cross-mating of the African honey bee, *A. mellifera scutellata* and several European honey bee races following the accidental release of a reported 26 African queens in 1957 from a breeding program in Sao Paulo, Brazil. After 30 years, evidence of this combination of population genes and additional natural selection has been based on morphological, behavioral, physiological, chemical, genetic and field population studies. The Africanized honey bee can be identified best by its aggressiveness and other behavioral traits, although there are small morphological as well as chemical differences that can be utilized to confirm Africanization.

Northern Migration

The "Africanization" of honey bees in Brazil required approximately 10 years, and the results were initially devastating to the beekeeping industry in that country. The Africanized honey bee has spread at the rate of 200 - 300 miles annually, depending on terrain and available resources. From Brazil the Africanized honey bee has moved southward approximately 1,000 miles into central Argentina. It had moved throughout northern South America to Panama (3,200 miles) by 1982 and through Central America into Mexico (an additional 1,100 miles) by September 1986. In 1990, the Africanized honey bee crossed the U.S. border into Texas. As of December 1998, the Africanized honey bees are established in southern Texas, New Mexico, Arizona and California. (Figure 1.)

It is currently unclear how far north the Africanized honey bee will be able to spread in the U.S. sub-zero temperatures. Perennial colonies exist in Africa at altitudes of almost 2,000 meters (6,500 feet), where snow lasts for up to a week at a time, and absolute minimum of temperatures of less than 0 degrees C (32 degrees F) are found for six months out of the year. However, recent studies have shown the over-wintering behavior of the Africanized honey bee is very similar to the European honey bee.

Africanized Honey Bee Characteristics

The Africanized honey bee is a subspecies of the European honey bee. While the two varieties of *A. mellifera* exhibit many similar biological and behavioral characteristics, there remain some very fundamental differences.

Africanized honey bees are probably most renowned for their defensive behavior. If Africanized honey bee nests are disturbed, they will retaliate more quickly and in greater numbers than their European relatives. It has been reported that they will pursue people or animals as much as 600 feet from an apiary. Reports also indicate that stinging incidents can be as much as 10 times greater compared to the reaction of European honey bees during a single encounter. Fortunately, the Africanized honey bee sting is very similar to that of a European honey bee in terms of the amount of venom administered and its chemical composition. Swarming Africanized honey bees are generally no more aggressive than their European counterparts.

The Africanized honey bee has been observed to be a great deal more difficult to manage than the European honey bee. This is due in part of their tendency towards frequent swarming and absconding. There have been documented examples of Africanized honey bee swarms actually taking over queenless European colonies and also small European colonies by killing the queen. Since the Africanized honey bee is capable of producing adult bees more quickly than the European honey bee, the colonies become completely Africanized within a few weeks. Absconding generally occurs when an area's nectar or pollen supply becomes depleted. The entire colony will abandon its nesting site and may seek out a new nest site some distance from the original. The swarming and absconding biology of the Africanized honey bee may pose serious management problems for beekeepers who are not accustomed to dealing with such behavior.

The Africanized honey bee is also noted for its diverse preference of nesting sites. For example, in South and Central America, Africanized honey bee hives have been found in old rodent burrows, abandoned cars, discarded baskets, and buckets. In Arizona several thousand swarms were found in water meter boxes. Such locations are generally not considered suitable to European honey bee colonies.

If the Africanized honey bee becomes established in Arkansas, the beekeepers of the state will no doubt be forced to learn new management techniques to adjust to a new age in beekeeping. Beekeepers, with the assistance of the applicable state agencies, should be able to deal with Africanized honey bees unless they are hindered by unfavorable public reactions (including municipal restrictions towards honey bees and beekeeping).

Value of Bees

It has been estimated that the Africanized honey bees arrival in Arkansas will be felt most severely by the beekeeping industry. There are approximately 800 beekeepers in Arkansas who manage approximately 75,000 colonies of bees either for honey production, pollination services, or both. Collectively, Arkansas' honey yields average 3.5 million pounds annually.

When compared to the value of crop pollination, honey production is a minor contribution from the beekeeping industry. Recently published studies give a value of the cultivated crops known to benefit from honey bee pollination at $10 billion annually in the United States. Honey bees benefit wildlife by pollinating their food plants. It would be very difficult to estimate the ecological value of honey bees; however, it can be assumed that this value equals or perhaps surpasses their agricultural value. The financial hardships created by the Africanized honey bees arrival will no doubt be passed from the beekeeper to the farmer and ultimately, to the consumer.

Potential Impacts

The following is a list of potential problems and concerns that could occur once the Africanized honey bee is present in Arkansas.

1. Over dramatization of the Africanized honey bees aggressive behavior by the press may lead to public prejudice against the beekeeping industry.

2. Public fear of the Africanized honey bee in some municipalities will mandate unrealistic bee regulation over common sense and sound logic.

3. Municipalities may pass restrictive ordinances against keeping bees.

4. The swarming, absconding, and stinging behavior of the Africanized honey bee may cause hobby beekeepers to lose interest and quit keeping bees.

5. Quarantines may restrict the movement of bees into agricultural crop pollination locations.

6. In crop pollination locations, the aggressive nature of Africanized honey bees may hinder the operation of farm machinery and prevent workers from entering fields.

7. Due to the reproductive biology (swarming and absconding) and nesting behavior of the Africanized honey bee, the public may be more likely to encounter Africanized honey bee swarms and colonies in cities, parks, forests, and neighborhoods.

8. The tendency of the Africanized honey bee to abscond when their hives are transported for pollination will increase the cost and difficulty of crop pollination.

9. The Africanized honey bee could interfere with timber harvest, fire control, and recreation in National or State Forests.

10. Concern over accidents/injuries associated with keeping Africanized honey bees may cause commercial beekeepers to go out of business.

11. The cost of transporting European honey bee for pollination services could increase.

12. Maintenance of European honey bee hives could increase due to the necessity of requeening hives yearly.

13. The costs to inform the medical and public health community of possible precautions and potential problems with Africanized honey bee sting encounters may rise.

14. The beekeeping industry is already suffering from the impact of mite pests and their problems will be compounded by the arrival of Africanized honey bees.

15. An increase in the number of stinging (possibly death) incidents of confined livestock and domestic pets.

Figure 1.

Recommendations

Recommendations for actions are given by the Committee in five priority areas. These areas are:

1. Education, training and public information.

2. Public health.

3. Quarantine and regulatory.

4. A management plan for Arkansas beekeepers.

5. Research priorities.

The recommendations that follow represent the best thinking of the committee on what should be done in each of these areas based on the current status of knowledge about the Africanized honey bee economics, behavior and potential for positive benefit.

Education, Training, Information

The economic impact resulting from the Africanization of the domestic, European honey bee populations in most South and Central American countries has been substantial. However, this loss has paled in comparison to the attention and coverage given by the media to the encounters of man with the "killer bees" - real or imagined. Most people have an overwhelming fear of venomous animals. At times, this attitude takes on phobic proportions, making it difficult to maintain a clear perspective on the problem of stinging insects. The African bees' defensive nature and perceived health implications have taken on unrealistic proportions in some news reports. To deal effectively with the true impact of the Africanized honey bee requires an informed public. The general public will need to be educated on what to expect and how best to deal with the problem, especially in large urban centers. This will require an extensive educational and organizational effort by key municipal groups (elected officials, police, fire fighters, emergency medical technicians, physicians and others) and cooperating beekeepers.

As its primary goal, the educational effort will provide beekeepers, agricultural producers, livestock operators, public officials, municipal action groups and the general public with factual information, which will be useful in making decisions involving economic enterprises and public health.

Objectives for the educational program include:

1. The development of an "Africanized Honey Bee Reference Manual" that will serve as the primary information source for County Extension Agents, Extension Specialists and other key educational personnel and groups and with other cooperating state agencies and associations. This loose-leaf, 3-ring binder reference will serve as a primary source used to inform the Arkansas public. Having available accurate, objective and interpretive information is the key to an effective educational program.

2. To complement the "Reference Manual", several fact sheets are proposed that target specific public clientele and provide answers to the primary questions/concerns anticipated. The targeted clientele include:

   A. Beekeepers (both hobby and commercial).

   B. Agricultural producers who have an economic interest (pollination service), provide apiary sites on their property or may have concerns about adverse impacts involving the introduction of Africanized honey bee.

   C. Livestock operators, especially confined operations.

   D. Municipal "action groups" organized to deal with the influx of Africanized honey bee in urban environments police, fire fighters, physicians, emergency medical technicians, pest control operators, private consultants, et al.)

   E. The general public.

3. The discovery of the first Africanized honey bee in Arkansas will be a major news story, generating possibly hundreds of press inquiries. It is expected that there will be several days, perhaps a week or more, of intense media interest. It is vital that the press be supplied with accurate information about the Africanized honey bee; there is great risk that the story will be sensationalized to the extent that the general public may over-react to the arrival of the Africanized honey bee to the point of hysteria. Preparations must be made for the logistics involved in handling a large contingent of reporters. These include costs for telephones to accommodate the press and to handle inquiries from the general public. Press materials must be prepared and mailed to news outlets in advance of the bees' discovery in Arkansas. Materials for television and radio news outlets also must be prepared for use in advance of the bees' arrival.

4. Conduct workshops, symposia, seminars and meetings with organized groups to create greater awareness and knowledge.

5. Develop audio-tutorials, video tapes, slide sets, graphic visuals, etc., for use by organized groups and by the print, television and radio media.

Public Health

The frequency of stinging incidents may increase, which may increase the number of people who will develop allergic reactions and require treatment by medical personnel and facilities. The medical treatments for Africanized honey bee stings will be the same as currently recommended

for domestic honey bees, therefore emergency medical services and other health care personnel should require no additional specialized training. The health care community should be alerted through an educational effort that Africanized honey bees may represent an increased risk of both being stung and receiving multiple stings. The enhanced possibilities of serious interactions with other existing medical conditions should also be emphasized.

Medical emergencies arising from Africanized or European honey bee stings will fall into two categories:

1. In a sensitized individual, one or more stings may produce an allergic response resulting in a number of symptoms from localized swelling, feeling faint or dizzy (broncho constriction asthma), angioneurotic edema, hypotension (shock or low blood pressure), to fatal cardiovascular collapse. This can occur with either a single sting or multiple honey bee stings. Treatment will consist of epinephrine and other supportive care as the clinical situation dictates and as would befit the management of any IgE-mediated hypersensitivity reaction from any cause.

   Nothing in the medical literature suggests that Africanized honey bee stings are more reactogenic than European honey bee stings. Any increase in these types of reactions from Africanized honey bees would therefore be expected to occur as a result of an increased likelihood of a bee sting from a stronger defensive behavior.

2. In the unlikely event of an extensive exposure to 500-2000+ bee stings as a result of Africanized honey bees, a potentially lethal human envenomization resulting from direct toxic effects could occur. Case reports in the medical literature use supportive care in these situations.

   It should be emphasized that, aside from a need to alert the medical care community and general public alike that Africanized honey bees may represent an increased risk of both being stung and receiving multiple stings through stronger defensive behavior, no additional specialized training in the medical management of these bee stings should be required for Emergency Medical Services and other health care personnel.

   No bees, wasps, yellow jackets, hornets, or other stinging arthropods of *any* kind should be allowed to nest in any house, garage, barn or other structure used by people or domestic animals. Because any of these creatures will defend their nests when they feel threatened, it is only prudent to eliminate nests in those areas such as yards, parks and buildings-where human activity may be perceived as threatening.

Regulation and Quarantine

Based on previous experience with the spread of the Africanized honey bee through the Americas, the natural spread of the Africanized honey bee is preceded by isolated colonies that swarm or abscond from the main population centers. The Advisory Committee feels that

substantial benefits would result by rapid detection, identification and eradication of these isolated colonies. The procedures outlined in this regulatory and quarantine plan parallel those contained in the APHIS Action Plan for isolated Africanized honey bee infestations that have arrived through accidental introductions. Immediate quarantines and destruction of confirmed colonies and appropriate surveys of prescribed dimensions around these early isolated "finds" should temporarily stabilize the situation. Available data indicates that swarming colonies do not travel beyond the 100-mile distance that dictates the need for a secondary level of restriction on bee movement. This tiered approach around these initial "finds" allows state and federal regulatory agencies to deal effectively with these isolated swarms and still permits free movement of European honey bee colonies within the larger 100-mile quarantine zone needed for crop pollination and honey production. It is believed that such action also would encourage beekeepers to voluntarily cooperate by remaining in the area and not attempting to break quarantine. This could avoid the possibility of spreading undetected Africanized colonies great distances from these initial "finds."

A rapid and well-defined regulatory response to the first few positive "finds" of Africanized honey bee in Arkansas is critical to the perceived effectiveness of the Arkansas Africanized Honey Bee Plan by both the beekeeping industry and general public. Such a response will go far in reassuring regulatory officials in sister states who work with Arkansas migratory beekeepers and will reduce the amount of sensational coverage by the news media, thus lessening the potential panic reaction by the general public.

The following combined state/federal regulatory responses are planned to take effect as the swarms enter Arkansas:

Recommended Quarantine and Regulatory Actions (to be in effect until 5 distinct and separate geographic locations have been involved with a positive find):

1. When a speculative report of Africanized honey bee is received, the following procedure will be implemented:

    A. If suspected colony or colonies exhibit aggressive characteristics, all colonies in apiary will be quarantined until laboratory results are received. No other quarantine will be established until Africanized honey bee is positively determined. If samples are negative, quarantine will be lifted. Drone and queen traps may be installed on all hives located in the suspect apiary to prevent the spread of reproductions.

    B. Sample the colony or colonies under suspicion.

    C. Send samples to qualified laboratory for identification.

    D. If suspected colony is feral, a sample will be taken and the colony destroyed if Africanized honey bee is confirmed.

    E. If the laboratory samples are positive for Africanized honey bee, more extensive

quarantine zones will be established and an area survey will be initiated.

2. Quarantine procedure to be initiated following first Africanized honey bee confirmation:

   A. Quarantine positive colony, colonies or apiary and all other colonies within a 2-mile radius. A survey will be conducted within the 2-mile radius to determine the extent of the infestation. No movement of bees will be allowed into or out of the 2-mile quarantine until all Africanized honey bee colonies have been destroyed and the survey completed. Quarantine will be lifted if survey indicates that no Africanized honey bee colonies are still present within the area.

   B. An additional quarantine area covering all counties touching a 100-mile radius of a positive Africanized honey bee find also will be established. Movement will be allowed into, but not out of this quarantine area, and within this quarantine with the exception of colonies within a 2-mile radius of any positive Africanized honeybee find. To facilitate the survey, all colony locations within the 100-mile radius quarantine must be registered with the Plant Board and have operational permits, where required. The Arkansas Highway Patrol and municipal police departments will be asked to cooperate by reporting any honey bee movement by trucks out of the quarantined area. Beekeepers who fail to comply with the quarantine are subject to penalties outlined in the Arkansas Apiary law and regulations.

   C. The 100-mile quarantine will remain in effect until the Africanized Honey Bee Advisory Committee recommends extension, modification or abolishment of said quarantine.

3. Survey and Eradication:

   A. All Africanized honey bee colonies will be destroyed (within the 2-mile quarantine area). The method of destruction of Africanized and feral colonies will be with currently labeled, effective insecticides administered according to label instructions and proper safety precautions.

   B. All colonies within a 2-mile radius of an Africanized honey bee confirmation site will be sampled. Mandatory re-queening of these colonies with certified European honey bees may be required.

   C. If Africanized honey bee is found in a beekeeping operation which has other bees (maintained in Arkansas) outside the 2-mile quarantine, they will be sampled.

   D. Bees in re-queened hives will be monitored for Africanized honey bee traits until released by the Africanized Honey Bee Advisory Committee.

   E. All feral swarms detected within the 2-mile radius will be destroyed.

F. All feral colonies detected within the 100-mile radius quarantine will be sampled and destroyed if found to be Africanized honey bee.

G. Survey within 100-mile radius to be conducted by inspectors and other designated personnel from cooperating agencies.

H. All samples will be sent to approved identification laboratories.

I. New confirmations of Africanized honey bee in all other areas within the 100-mile radius quarantine will be handled as outlined in the above procedures.

4. Memoranda of Agreement will be established between cooperating agencies outlining responsibilities of each agency in the program.

5. Regulatory Management:

A. If/when the Africanized Honey Bee Advisory Committee determines, based on survey results and other scientific data, that Africanized honey bee has become established, it will recommend that depopulation cease and be replaced by a management program as outlined by the Africanized Honey Bee Advisory Committee.

B. When Africanized honey bee has been declared established in the 100-mile quarantine area, then under the authority of the Arkansas Apiary law and regulations, all colonies in the quarantine area will be required to be requeened annually with a clipped and/or marked queen (of known) European ancestry and mated to European drones). Upon annual inspection, if the beekeeper finds a clipped and/or marked queen in the colony, then replacement is optional. If during routine inspections, the inspector finds a colony(ies) may be Africanized, then that colony will be sampled and tested for Africanized honey bee. If a colony tests negative for Africanized honey bee, then the queen may remain in colony until the annual requeening. If a colony tests positive for Africanized honey bee, then the beekeeper will be given two weeks to requeen with clipped and/or marked European queen, or show evidence that he is attempting to requeen said colony(ies).

6. The Africanized Honey Bee Advisory Committee will review the regulatory program on a periodic basis to determine if any changes in the program are deemed appropriate.

Recommended Management Plan

The purpose of this management plan is to assure that domestic beekeepers have a strategy to maintain a viable honeybee industry for Arkansas.

Any effective management of the Africanized honeybee must occur with the beekeepers. The

following management recommendations are suggested as "best practices" to be implemented at the discretion of the beekeeper by the time the state is declared Africanized honeybee infested. Queen management is expected and will be regulated under the Plant Board. Other management techniques recommended are those currently available. New management techniques will be recommended when they become available from research.

Bee Management Techniques:

1. Queen Management (Also see Regulation and Quarantine Section recommendations)

    A. Re-queen annually for all colonies.

    B. Re-queen with marked and/or clipped queens (certified or known to be of European ancestry and mated to European drones), preferably at least once per year.

    C. If an unmarked queen is found during annual inspections, it is recommended that she be destroyed and the colony re-queened immediately with a marked and/or clipped queen of known European ancestry.

    D. All aggressive colonies must be rqueened or destroyed.

    E. Maintain re-queening records and sales receipts to be shown to Plant Board personnel upon request.

2. Drone Management

    A. At least 10% of all colonies in an apiary should be managed for drone production according to established procedures.

3. Feral Colony Management

    A. Place swarm traps (bait hives) near established apiaries.

    B. Destroy all swarms captured.

    C. Destroy all feral colonies discovered in nature in the vicinity of the apiary operation. The recommended method for destroying feral colonies is discussed in Section 3 of Regulation and Quarantine.

4. European Certification

    A. Beekeepers will need to work with Plant Board personnel to gain certification that they are doing a good job maintaining European stock. (This will become the beekeeper’s best defense against negligence law-suits in the case of any type of a

stinging incident.)

Research Priorities

1. The most pressing need is for a state laboratory that will be primarily responsible for testing samples from colonies suspected of being Africanized so that management and containment efforts do not become bogged down by an out-of-state identification laboratory's backlog. Identification techniques have improved over the last few years, making it cost effective to equip and staff a state lab to process large numbers of samples. This laboratory also will coordinate the distribution of Africanized honey bee samples to independent researchers and maximize communication between researchers, government, beekeepers, agricultural producers and the general public.

2. Queen Rearing (Artificial Insemination) - If the Africanized honey bees become established in Arkansas, then it will be essential to have stocks of known (certified) European colonies. At the present time most of the queen bee stock used in Arkansas comes from the southeastern states. Those sources of European honey bees may no longer be available if the Africanized honey bees become established in those states.

   One solution to this problem is to develop and maintain a queen rearing facility at (where?) which will emphasize artificial insemination to assure that "known" stock is being used to produce queen honey bees for dissemination to beekeepers throughout the state.

   The establishment of a queen rearing facility at (where?) that utilize artificial insemination to control the genetics of the queen bee program would benefit the state's beekeepers in several problem areas. First, it would provide certified European honey bee stock that could be used to requeen Africanized honey bee colonies on an as needed basis. In addition, it could also be used to initiate research on developing honey bees that are resistant to tracheal and Varroa mites.

3. Development of a self-sufficient queen and package industry.
   Recommendations:

   A. Breeder queens - Develop a state supported program to provide Arkansas certified artificially inseminated European honey bee breeder queens to the state's queen and package producers. Nurture existing queen and package producers currently operating in the state by:

      1. Working with these businesses to obtain funding (grants, government

loans) for expansion.

2. Providing technical assistance to improve product quality.

3. Encourage the development of new queen and package producers in the state.

APPENDIX A.

Suggested Agencies of the Africanized Honey Bee Advisory Committee

Agricultural Experiment Station

State Extension Service

State Plant Board

State Department of Education

State Department of Health

Farm Bureau

United States Department of Agriculture

Plant Health Inspection Service

State Beekeepers Associations

Public Service Organizations, i.e. Lions, Kiwanas, Rotary, etc.

Game and Fish Commission

Parks and Tourism Department

State Police

APPENDIX B. GLOSSARY

Absconding - behavioral trait of all adult bees (queens, workers and drones) abandoning the hive when threatened by starvation, a predator or other colony disturbance. This is a common phenomenon of Africanized honey bees, but rare in domestic races of honey bees.

Apiary - a place where bees are kept; a collection of hives or colonies of bees kept for their honey.

Apis mellifera - scientific name of honey bee.

Apis mellifera scutellata - African honey bee.

Bait hive - an artificial nest cavity to attract swarms.

Breeder queen - a queen selected to produce larvae with which to raise daughter queens.

Colony - a group of honey bees consisting of a queen and worker bees, with or without drones, organized as a social community.

Established colony - a colony located in a nest or cavity with comb.

Feral Colony - bees found in the wild; not kept or managed by humans.

Infestation - the presence of one or more established Africanized honey bee colonies or two Africanized honey bee swarms.

Lbs/Col - pounds per colony.

Managed colony - a colony of bees in a man-made hive kept or managed by humans.

Migratory colony - managed bees transported by beekeepers to various locations.

Non-migratory bees - managed bees kept in one area on a year-round basis.

Nuc - nucleus; small made-up colonies, with box and frame, rather than bees and queens alone.

Pheromones - sex attractants, used to attract Africanized bees to traps.

Resident bees - the bees present in an area, both managed and feral.

Swarming - the process by which social insects increase the number of colonies; thus, increasing the possibility of survival. Studies have shown that each Africanized honey bee colony typically swarms four to eight times annually, probably due to available resources. This compares to less than one swarm per five colonies for European honey bees.