African Bee Pest Risk Assessment

Identity

Scientific Name: *Apis mellifera scutellata*
Phylum: Arthropoda
Class: Insecta
Family: Apidae
Common Name: Africanized bee, African bee, AHB, "killer bee"

African honeybees (AHB) and European honeybees (EHB) look identical and need to be distinguished by scientists with special lab equipment.

Relative Risk Rating: LOW to MEDIUM

Total Numerical Score: 11 (maximum 25)
Uncertainty: very high

Pest Background:

The African honeybee subspecies, *Apis mellifera scutellata* (AHB), was introduced into Brazil in 1956 to try to create honeybee populations that were better suited to tropical climates (Mistro et al. 2005). After its introduction AHB spread quickly throughout most of South America, Central America, Mexico, and as far north as the southern US. AHB has been spreading more slowly as it moves into temperate regions due to fewer survival advantages than EHB (Sanford and Hall 2005). It is predicted that in the US there will be a similar situation as Argentina where a hybrid zone will be formed. The European honeybee will remain established in the northern US and the African bee will become established in the southern US (Ohio State University fact sheet: http://beelab.osu.edu/factsheets/sheets/2124.html, Winston 1992).

Although the movement of AHB has been studied and documented more than any other invasive insect (UF News 2005), it is unknown how far north AHB populations will establish. According to Schneider et al. (2004) " In summary, it is not possible to predict the geographic range and impact of the African bee in the United States at this time." There are many factors that affect the ability of the bees to colonize in the Americas such as behavioral and metabolic factors (Winston 1992), day length, migratory beekeeping practices, average low temperatures, annual rainfall, and bee parasites (Schneider et al. 2004).

AHB is of concern to the public and to beekeepers. African bees are much more aggressive than European honeybees. African bees guard a larger area around the hive, will chase threatening humans or animals for up to a quarter of a mile, and respond in larger numbers (http://www.cdfa.ca.gov/phpps/pdep/target_pest_disease_profiles/factVSfiction.html). Beekeepers in the US are better prepared than those in countries south of us but will have added costs to their operations. They will lose apiary locations, experience resource competition, and will need to requeen frequently (Sanford & Hall).

Spread Potential to Oregon: MEDIUM (numerical score 3)

It is possible that African queens could be transported to Oregon by beekeepers. Oregon bees are moved for pollination service to California where AHB are established (map of AHB in California almond growing areas: http://www.cdfa.ca.gov/PHPPS/PE/InteriorExclusion/images/grow_area_south.jpg). If an Oregon colony loses its queen during transport or stay in California and requeens itself in an area where there are African drones it will become Africanized. Then this colony would be transported back to Oregon when pollination service is complete.

Even if Africanized colonies are produced through requeening Oregon beekeepers would surely destroy any suspicious hives. Several years ago an Oregon beekeeper mentioned that he helped to destroy a very aggressive colony that was suspected to be AHB (personal communication). Although Oregon beekeepers that have a mobile inter-state business may accidentally assist in creating Africanized colonies they will likely be our greatest ally in keeping the state free of AHB.

Establishment Potential in Oregon: LOW to MEDIUM (numerical score 2)

It is very difficult to predict whether AHB will establish in Oregon. There are too many factors that contribute to the ability of AHB to move and establish in new areas. Even if we examine only a few of the major environmental factors that affect AHB's movement, such as latitude, temperature, and rainfall, there is still a very high level of uncertainty of establishment.

If simply comparing the latitudinal limits of AHB in South America to the US the bees shouldn't establish much farther than 34ºN latitude (Schneider et al. 2004). But, AHB is known to be established as far north as Nye County, Nevada (National Agricultural Pest Information System, 2007) which spans as far north as 39ºN latitude. Latitude may be one important factor in predicting the general spread of AHB but shouldn't be used for the purpose of drawing exact establishment limits.

According to the literature, it is unclear whether AHB can survive extended periods of cold temperatures (Schneider et al. 2004). An example of the difficulty in predicting AHB movement and establishment based on temperature is the situation in the southeast US. It was predicted that AHB would spread and thrive throughout the southern US because this region has a climate with mild winters. Despite adequate temperatures for AHB in states east of Texas, AHB have failed to establish (Villa et al. 2002). One possible explanation is that AHB doesn't do well in areas with higher rainfall. The annual rainfall in the states where AHB hasn't established is more than 50 inches a year (Villa et al. 2002).

Oregon's most southern latitude is 41ºN. If latitude is indeed a factor in AHB survival, then only certain areas of southern Oregon may be suitable for AHB. Much of the SE desert areas of Oregon, as well as much of the high-desert inter-mountain west and Great Basin, have similar low temperatures to those in Nevada. The desert regions also have relatively low rainfall, approx. 7-15 inches/year (http://www.ocs.orst.edu/county_climate/Malheur_files/Malheur.html and http://www.nvenergy.com/economicdevelopment/county/nye/quality.cfm). The most mild winter area in Oregon, the south coast, is also an area with fairly high annual

rainfall (60 or more inches per year). The high rainfall on the south coast may prevent AHB from establishing. The conditions in the Willamette Valley are marginal. The temperatures are fairly mild but the rainfall ranges from 20 to 60 inches (http://www.ocs.orst.edu/pub/maps/Precipitation/Total/States/OR/or.gif). AHB seems to prefer a fairly warm and dry climate, conditions that mostly don't exist in Oregon. Perhaps the most likely place AHB could establish is southwest Oregon in the Ashland and Medford area valleys where the climate is fairly mild and has about 20 to 30 inches of rain a year (http://www.ocs.orst.edu/county_climate/Jackson_files/Jackson.html). Overall, the potential for AHB to establish in Oregon is likely low to medium.

Environmental Impacts to Oregon: LOW (numerical score 1)
Similar to the European honeybee, AHB is not native to North America. The environmental impacts are likely minimal since they will either displace EHB or hybridize with them. There are many studies that suggest that honeybees compete with native pollinators (Goulson & Sparrow 2009). Since wild and managed EHB colonies already exist in Oregon the environmental impact of AHB is expected to be low.

Economic Impacts to Oregon: LOW to MEDIUM (numerical score 3)
Managed honeybees are important for pollinating many Pacific Northwest crops such as tree fruits, berries, cucurbits, and crops grown for seed (2008 Pacific Northwest Insect Management Handbook, http://pnwpest.org/pnw/insects). The value of bee pollinated crops in the northwest is estimated to be $1.7 billion (Burgett, 2004). Africanized bees would most likely impact beekeepers and the growers that rely on these managed bees for pollination. AHB will increase the costs for maintaining bee colonies (extra costs for inspection and certification for migratory beekeepers, replacement of queens, higher worker wages, etc.), reduce the number of locations where bees can be managed, and reduce honey yield. Two Mexican beekeepers report that there are two benefits to having AHB colonies: less brood diseases and less hive thefts (Ratnieks and Visscher 1996). Hive thefts may not be as common in the US but brood diseases in EHB are certainly an important problem for beekeepers.

Tourism would be affected in Oregon if large numbers of wild AHB colonies became established here, especially since outdoor activities are popular attractions in this state. Noisy recreational equipment (boats, ATVs, etc.) may promote AHB attacks.

Although there is little documentation about the effects of AHB on domestic animals there have been reports of animal deaths in AHB infested areas (Mississippi Africanized Honey Bee Reference Manual 2007).

The economic impact on agriculture in states where AHB is established has been less severe than what was predicted (Schneider et al. 2004)

Health Impacts to Oregon Residents: LOW (numerical score 2)
In areas where African bees have been established for 5-10 years most of the African bee genes are retained (Schneider et al. 2004). Even if AHB doesn't establish as far north as Oregon, the hybrid zone may reach this state. It is likely that in the hybrid zone AHB will retain at least some African bee traits such as excessive stinging behavior or frequent swarming.
Although the sting of AHB is no more toxic or painful than a sting from EHB, you are

more likely to receive stings from more aggressive bees.
In states where AHB has been introduced or established the impact on human health was much less than expected (Mississippi Africanized Honey Bee Reference Manual 2007). The low impact is likely due to the fact that the US was fairly well prepared for the arrival of AHB. However, the number of stinging incidences in Oregon will likely increase if AHB becomes established here.

References:

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