Apicultural researches highlights of A. Bugshan Chair for Bee Research, (2011 -2017) King Saud University, Saudi Arabia

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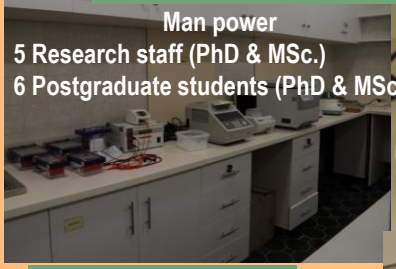
Capacity

It is full-fledged apicultural research unit of the university

It has well equipped laboratory with advanced equipment: GSM, HPLC, PCR, and others

Man power
5 Research staff (PhD & MSc.)
6 Postgraduate students (PhD & MSc.)



2 Research apiaries

Research projects developed & implemented

- Since 2011, 13 big research projects have been developed and grants were awarded based on their merits
- The projects focus in area of:
  - Bee health,
  - Bee forage,
  - Queen rearing,
  - * Bee products,
  - * Genetics & biology
  - * Socioeconomics aspects of apiculture & others
- Categories of research
  - Basic
  - Applied
  - Adaptive (Problem oriented & demand driven)
- Except few going, most are successfully completed and reported

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Some of the specific research activities under different categories:

1. Bee products (honey and propolis):

- Composition and physicochemical properties of different origin honeys and propolis
- In-vitro and in-vivo, evaluation of anti-microbial properties of propolis & honeys against multi drug resistant human pathogens
- Quality and authentication of local honeys

- 16 researches conducted & published

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2. Bee biology and genetics

- Characterization of native bee races based on genetic and morphometric analysis,
- Comparative studies between exotic and indigenous bee races
  - Tolerances to extreme temperatures and humidity and their impacts,
  - Adaptive morphological traits,
  - Seasonal population dynamics & performances,
- Natural nest characteristics of indigenous bee race

❖ About 14 research activities were conducted and published

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3. Honey bee disease and pests

- Diagnostic survey and molecular detection of geographical distribution of honey bee diseases,
- Fertility and reproductive biology of Varroa jacobsoni Oud. in local and exotic bees,

Treatments

- In-vitro evaluation of some essential plant oils against some honey bee pathogens (AFB & ChB),
- Antagonistic effect of honey bee gut bacteria against some honey bee pathogens,

❖ 8 research were conducted and published in area

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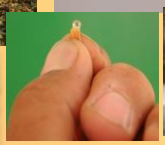
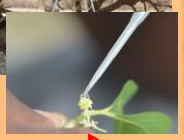
4. Honey bee forages, nectar secretion and pollination

- Identification and characterization of bee forages

- More than 200 bee forage species identified
- Distribution and & relative

- Determination of nectar secretion dynamics and honey production potentials of honey source plants,





Washing techniques for crystalized sugar & minute nectar volume

Direct measuring of nectar

Honey production potentials of species per flower, per plant and per hectare of land determined

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- **Pollination biology and ecology major acacia species were determined,**

phenology of ***Acacia species***

7 research were conducted and published

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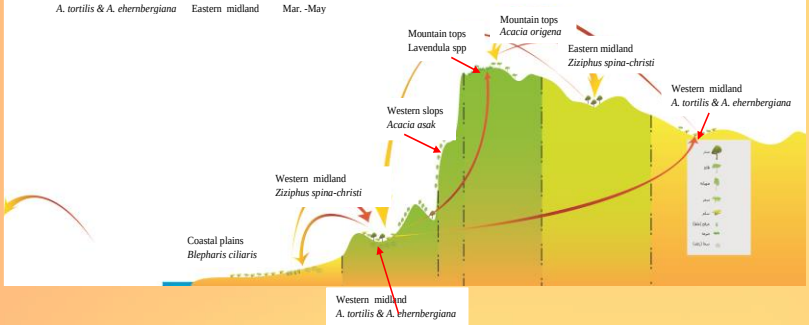
Beekeepers guide on flowering calendar and seasonal colony migration

Fig. 7 Schematic representation of major bee forage species flowering calendar and seasonal colony migration in the typical landscape of the region

Species	Ecology	flowering ana migration periods
Dipterygium glaucum	coastal plain	Dec. -Jan.
Ziziphus spina-christi	Western midland	Oct. -Nov
A. tortilis & A. ehernbergiana	Western midland	Feb. -Mar
Acacia asak	Western slops	Aug. - Sep.
Lavendula spp	Mountain tops	May -June
Acacia origena	Mountain tops	May -June
Ziziphus spina-christi	Eastern midland	sep. - Oct.
A. tortilis & A. ehernbergiana	Eastern midland	Mar. -May



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5. Application of GIS and RSS image analysis in apiculture

- Vegetation characterization and determination of spatio-tempral distribution of bee forage
- Determination of optimum carrying capacity of wadi (valleys)
- Trends and impact of land use on apiculture over time,
- Drawing of suitability map for beekeeping & technology adoption

❖ 6 researches were conducted & published

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6. Socioeconomics aspects of apiculture & marketing of honey

- Socio economic analysis of beekeeping,
- Marketing of honey (structure, function, quality perception, consumption and price) studied,
- Profitability of beekeeping in different hives.

❖ 5 research activities were conducted and published

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Importance of applied and adaptive researches

- Peculiarities of the region
  - Different honey bee race (morphology, biology and behavior),
  - Different environmental factors (forages availability and climate conditions),
- The beekeeping challenges are specific to the region,
- Direct adoption of technologies and practices may not be successful,
- adaptive & applied researches suitable to local conditions are important

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Scarcity of indigenous colonies and absence of well proven mass queen rearing techniques are important challenges

- Responses of *A. m. jemenitca* to queen rearing techniques were evaluated
- Acceptance rate & quality of queens reared in different queen cup sizes, wet and dry grafting & under +Q & - Q colonies conditions were investigated.






Better acceptance rate (60-70%) was obtained under queen less and wet grafting conditions

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Degradation of bee forage landscape is one of the challenges of current beekeeping in the region








As result production and productivity of beekeeping are declining significantly

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Assessing the possibility of rehabilitation degraded apicultural landscapes



Screening of multipurpose indigenous bee forage species



Degraded land

Plantation

Promising results are observed after 2 years

Awareness creation & community participation




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Nest volume, comb spacing & bee space *A. m. jemenitica is* different form other races


Cell depth = 9.4 mm
comb spacing = 30 mm
bee space = 7 mm




14 combs /40cm = 40% more combs

Redesigning box hives and accessories suitable to local bees biology & ecology

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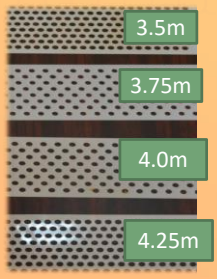
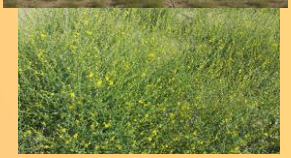
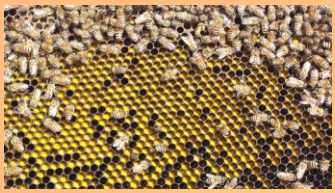
Determining the optimum opening size for pollen harvesting device (4.0mm hole size is suitable to harvest pollen load from local bee)







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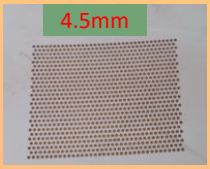
Determining the suitable opening size of queen excluder

4.0, 4.25, 4.5, 4.75 & 5.0mm tested



Queen excluder with 4.5 mm opening was suitable to exclude *A. m. jmenitica* queens

Queen excluder

Using shallow supper with suitable queen excluder observed to improve quality and quantity of honey

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Thank you
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