Weill Cornell Medicine-Qatar

# WCM-Q team reveal secrets of the date palm

Researchers at Weill Cornell Medicine – Qatar (WCM-Q) can now predict whether a date palm seed will produce a male or female plant with effectively 100 percent accuracy – with huge implications for the commercial use of the plant.

The team led by Dr. Joel Malek, assistant professor of genetic medicine and director of the Genomics Core at WCM-Q, already knew that the sex of the date palm plant is determined by the XY system, whereby the male of the species determines the sex of the offspring, similar to the way that human gender is determined. They also knew that a large region of genes appeared to be always associated with gender but were unclear on the specific DNA responsible.

That uncertainty has now been solved, and in doing so the research team has discovered how to predict the sex of all 14 palm tree species within the *Phoenix* genus – the genus that contains the date palm. They did this by decoding the genome of each species to calculate which genes appeared in the male plants but not the females.

Dr. Malek said: "The mechanism was narrowed down to four genes that every male plant in the entire genus had, but that were absent in the female plants. Essentially, those four genes are responsible for a tree producing pollen."

He added that the Phoenix genus was one of only a few examples where the sex determinants are the same across the entire genus.

The discovery, which has been reported in the high impact journal *Nature Communications* could have major implications for both commercial agriculture and horticulture.

For farmers growing date palms and harvesting the fruit, it is important to have as many female plants as possible to maximize crop yields. Conversely, city planners and landscape gardeners who plant palm trees for aesthetic reasons prefer male plants, as they do not produce fruit which must be cleared up when it drops.

Dr. Malek said: "Farmers must traditionally wait four or five years to discover whether the trees that they have planted will yield fruit or pollen so genetic testing of the seeds can ensure a high ratio of female plants are grown, with only a few male plants being cultivated for pollination purposes.

"At the same time, the genetic test can be used on other species in the genus that are also important such as Canary Island date palm which is extremely widespread in the world at large for landscaping."

Future research will see Dr. Malek and his team identifying the genes which control features such as the date's size, sweetness and texture, along with its resistance to certain diseases and stress factors like drought.

This research was funded by an exceptional proposal grant (NPRP-EP X-014-4-001) from the Qatar National Research Fund (QNRF). Without the support from QNRF such cutting edge research with national, regional and international implications would not have been possible. QNRF is a member of Qatar Foundation.

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**Photo caption:**
Researchers Lisa Mathew, Yasmin Mohamoud, Joel Malek and Karsten Suhre.

**About Weill Cornell Medicine - Qatar**
Weill Cornell Medicine - Qatar is a partnership between Cornell University and Qatar Foundation. It offers a comprehensive six-year medical program leading to the Cornell University M.D. degree with teaching by Cornell and Weill Cornell faculty and by physicians at Hamad Medical Corporation (HMC), Aspetar Orthopedic and Sports Medicine Hospital, the Primary Health Care Corporation, the Feto Maternal Center, and the Sidra Medical and Research Center who hold Weill Cornell appointments. Through its biomedical research program, WCM-Q is building a sustainable research community in Qatar while advancing basic science and clinical research. Through its medical college, WCM-Q seeks to provide the finest education possible for medical students, to improve health care both now and for future generations, and to provide high quality health care to the Qatari population.

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