



# Application of Agriculture biotechnologies in improving Date Palm production and products

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# Agriculture biotechnology

**It is a group of technologies in Biochemistry, Microbiology, Plant physiology and biophysics working together in favor of plant micropropagation, plant development by improving the genetical or chemical components to produce new materials of great value for human**



# Application of biotechnology

## تطبيقات التقنية الحيوية في الزراعة

- **Green biotechnology** (تسمى التقنية (الحيوية الخضراء وتشمل :
- **includes**
- **Micropropagation** الإكثار الدقيق
- **Molecular Analysis** التحليل الجزيئي
- **Genetic Engineering** الهندسة الوراثية



# List of Date Palm cultivars- Protocol developed at KACST

قائمة بالنخيل المدروسة نسيجيا بالمدينة

Cultivars	No. of embryos produced	No. of plants	
		Regenerated	Rooted
Mosaifah	450g	430f	344g
Maktomi	395f	265e	185d
Barhy	365ef	216d	122c
Koweriah	350e	286e	275f
Subbakah	135c	105c	60b
Shagra	138c	100c	70b
Sukkary	189d	125c	86b
Nabtet Ali	492h	229d	204e
Khalas	106b	65b	63b
HSD	32.42	27.98	30.74



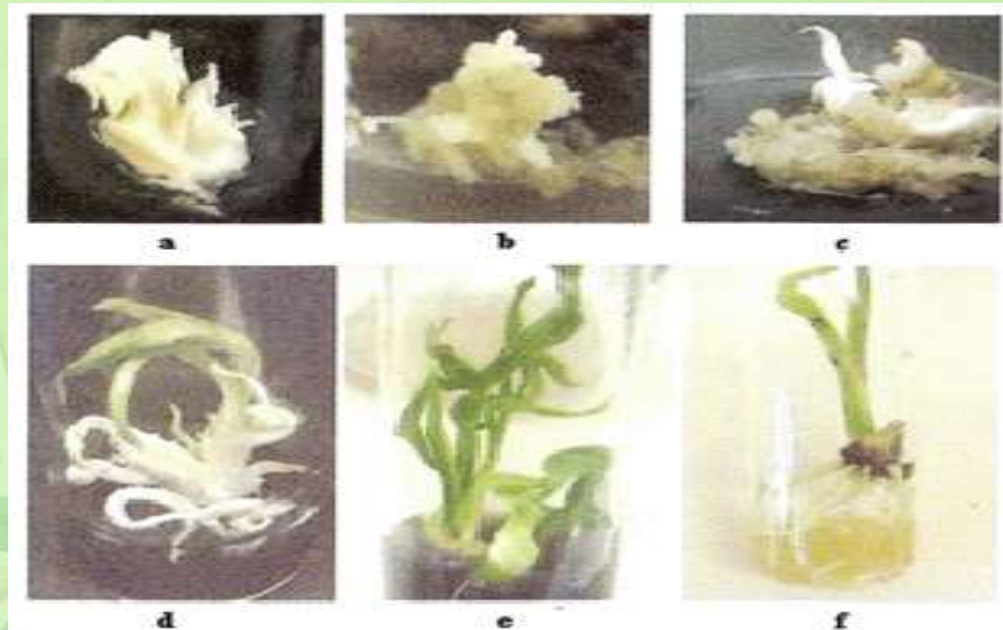
Initial culture: 5 embryos were cultured in each tube and 5 replicates were used for each cultivar.  
Mean separation within columns by Tukey's HSD at  $p < 0.05$ .



# مراحل تشكل وتميز بادرات النخيل بالانابيب

**In vitro regeneration in Date Palm cv Mosaifah**

- a) Explants; b) Embryogenic callus;**  
**c) Embryogenesis;** **d) Embryo multiplication and germination;**  
**e) Regenerated plant;** **f) Rooted plant.**





# Micropropagation

## الاكثار الدقيق

- from vegetative structures: من الأجزاء الخضرية
- Meristem tip culture القمة النامية
- Axillary shoot proliferation البراعم العرضية
- Adventitious shoot induction البراعم الإبطية
- Organogenesis التشكل العضوي
- Somatic embryogenesis التشكل الجنيني
- from reproductive structures: من الأجزاء انتاجية
- Anther and pollen culture من أجزاء الزهرة
- Ovary and Ovule culture من المبيض
- Embryo culture من الجنين
- from tissue and cell culture: من الأنسجة والخلايا
- Callus culture زراعة الكالس
- Cell suspension culture زراعة الخلايا العالقة
- Protoplast culture زراعة البروتوبلاست



# Activities: Plant Propagation Tissue culture technology



**Initiating  
embryogenic callus  
and embryos**







# Tissue culture techniques

## Means and applications

### Methods :

- Organogenesis

- Embryogenesis

### Applications :

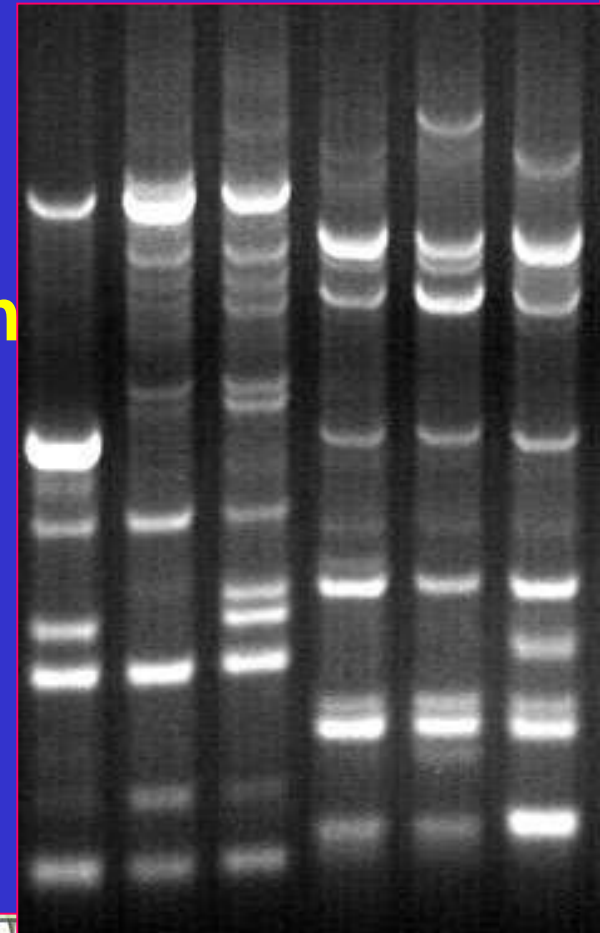
- Mass production of plants
- A mean for regenerating genetically modified crops
- Germplasm reservation
- A tool for bio-products processing



# Molecular analysis ( DNA Fingerprinting )

## The need for Molecular Analysis

- identify cultivars
- determine phylogenetic relations
- identify somaclonal variations
- determine genetic variability
- to protect property rights.





# Gene transformation

## Means and Objectives

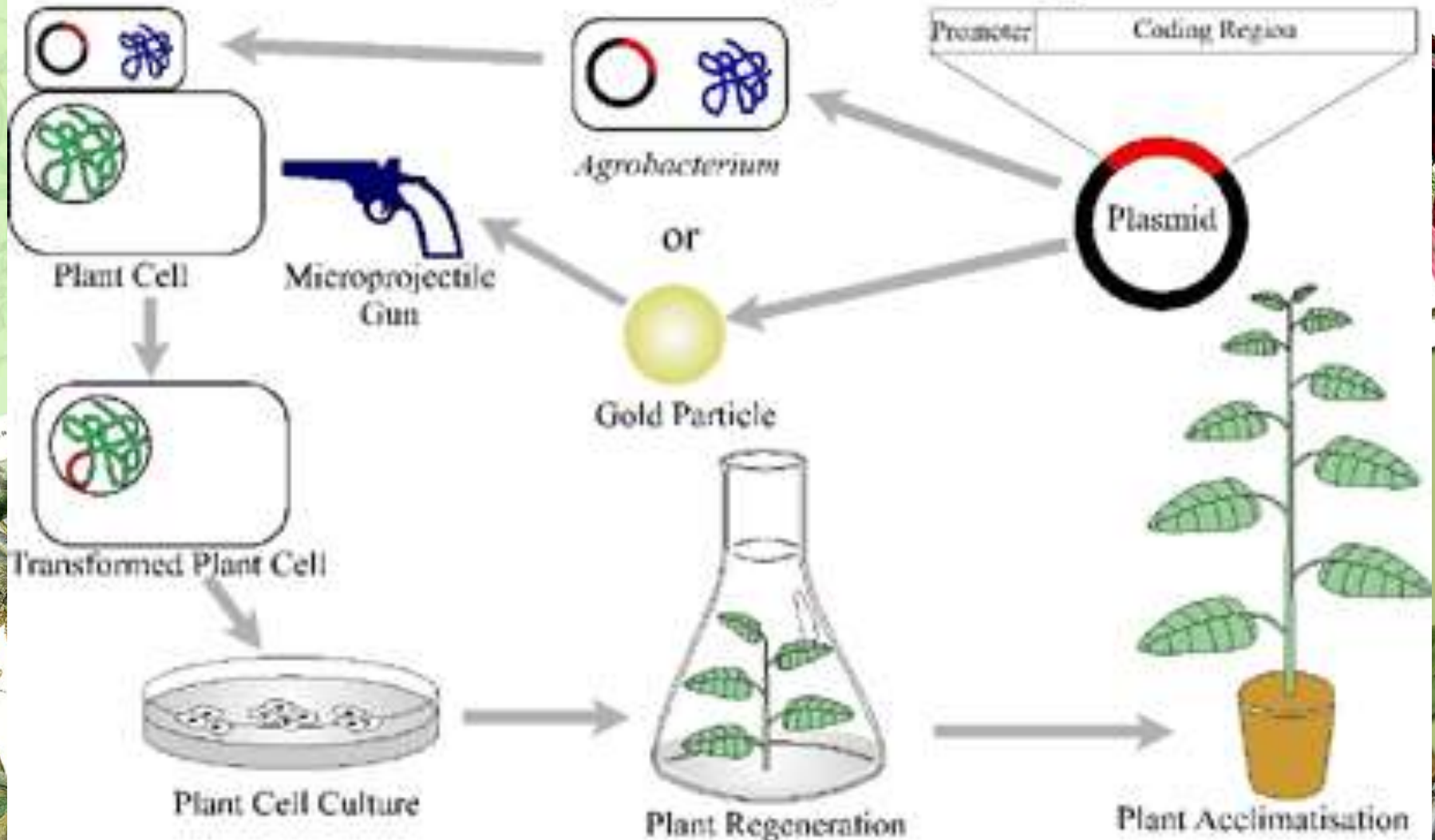
### Means :

- Direct injection
- Gun bombardment
- Agrobacterium mediated

### Objectives :

- Production of salt tolerant plants
- production of drought tolerant plants
- Production of Pest resistant plants
- production of food or feed GM

# Plant Genetic Engineering





# Applications

- **Plant propagation:**

- **Tissue culture and conventional propagation was applied in KACST and in my TC privat lab to produce rare varieties Date Palms and many desert plants that have environmental , economical and social values :**

- 1- Propagation of fire wood plants**

- 2- Rehabetation of Rawdat " Desert reservation "**

- 3- improving quality and increasing quantity of Palms**



# Applications

- **Genetical studies:**

- **Molecular studies were carried out to examine the genetical stability and true to type production of plants under research :**

- 1- DNA Fingerprinting of Date palm**

- 2- Genetical stability of Tissue culture sorted date palm trees**

- 3- genetical analysis of some Jojoba spp.**



# Applications

- **Gene transformation:**
  - **Due to the harsh conditions of Saudi Arabia many plants need to be genetically modified for specific genes to be inserted in the plant genome to increase its capability of stress tolerance or resistance, it was possible for us to modify some plants as :**
    - 1- **produce salt tolerant egg plants**
    - 2- **produce drought tolerant Tomatoes**
    - 3- **Propose to produce red weevil resistant Date palm.**



شكرا

Thank you





# Thank you

# شكرا لاجتماعكم





