

# MOROCCAN CROP PRODUCTION TECHNIQUES

*Best Practices for Major Crops (Conventional & Modern Methods)*

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## 1. Cereal Crops

### 1.1 Wheat (Soft & Durum)

- **Optimal Conditions:**
  - Soil: Clay-loam, pH 6.0–7.5
  - Temperature: 10–25°C (growing season)
  - Water: 400–600 mm (rainfed), 5,000 m³/ha (irrigated)
- **Key Techniques:**
  - No-Till Farming to conserve moisture (especially in semi-arid areas)
  - Banding Fertilizer to boost nitrogen-use efficiency by 30%
  - Stubble Mulching to reduce erosion (common in Tadla region)
- **Common Mistakes to Avoid:**
  - ✗ Late sowing (loses 1.5% yield/day after November 30)
  - ✗ Over-irrigation (causes root diseases)

### 1.2 Barley (Rainfed Systems)

- **Drought Adaptation Measures:**
    - Use of varieties like *Laanaceur* and *Adrar* (require only 250 mm of rainfall)
    - Planting depth of 4–6 cm to access deeper moisture
    - Intercropping with faba beans to improve soil nitrogen
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## 2. Horticultural Crops

### 2.1 Tomatoes (Greenhouse vs. Open Field)

- **Spacing:**
  - Greenhouse: 40 cm x 60 cm
  - Open Field: 50 cm x 80 cm
- **Irrigation Methods:**
  - Greenhouse: Drip system (2.5 L/plant/day)
  - Open Field: Furrow irrigation (5,000 m³/ha)
- **Expected Yield:**
  - Greenhouse: 120–150 t/ha
  - Open Field: 40–60 t/ha
- **Pest Control:**
  - *Tuta absoluta*: Controlled via pheromone traps (20 per hectare) + *Bacillus thuringiensis*
  - *Whiteflies*: Managed using yellow sticky traps and neem oil

## 2.2 Citrus (Oranges, Clementines)

- **Critical Practices:**
    - Pruning: Open-center system improves sunlight penetration
    - Fertigation: Use of NPK 8-3-9 with micronutrients (Zn, Mn)
  - **Frost Protection Measures:**
    - Wind machines (protect down to -3°C)
    - Over-tree sprinkling to form an insulating ice layer
  - **Post-Harvest Handling:**
    - Degreening with ethylene treatment for early-season harvests
    - Cold storage at 4°C and 90% humidity to extend shelf life by 3 weeks
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## 3. Arboriculture

### 3.1 Olive Oil Production

- **Orchard Design:**
  - Traditional Density: 100 trees/ha
  - High-Density: 500–1,600 trees/ha
- **Mechanization:**
  - Traditional: Manual harvest
  - Intensive: Use of shaker harvesters
- **Oil Yield:**
  - Traditional: 400–600 L/ha
  - Intensive: 1,200–2,000 L/ha
- **Mill Technologies:**
  - Traditional presses: 18–22% extraction rate
  - 2-phase decanters: 20–24% extraction, saves water

### 3.2 Date Palm Cultivation

- **Pollination Techniques:**
    - Manual: 10–12 male strands per female palm
    - Mechanical: Pneumatic pollen blowers cover 5 ha/day
  - **Pest Management (Red Palm Weevil):**
    - Pheromone traps (1 per 5 ha)
    - Trunk injections using imidacloprid
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## 4. Industrial Crops

### 4.1 Sugar Beet

- **Precision Farming:**
  - GPS-guided planting with 45 cm row spacing
  - SPAD meters for nitrogen needs via leaf monitoring
- **Harvest Innovations:**

- Use of defoliators (reduces soil tare from 25% to 8%)
- Field storage in ventilated piles (maximum 3 days)

## 4.2 Sunflower

- **Bird Deterrents:**
    - Acoustic: Propane cannons (effective coverage: 0.5 ha)
    - Visual: Reflective tapes combined with drone patrols
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## 5. Soil & Water Conservation

### 5.1 Drip Irrigation Systems

- **Design Parameters:**
  - Citrus: 50 cm spacing, 2.0 L/h flow, 6–8 hr/day
  - Tomatoes: 30 cm spacing, 1.6 L/h flow, 4–5 hr/day
  - Olives: 75 cm spacing, 4.0 L/h flow, 3–4 hr/day
- **Maintenance Guidelines:**
  - Clean filters weekly during flowering
  - Maintain pressure between 1.0 and 1.5 bar

### 5.2 Contour Farming (For Slopes >5%)

- **Implementation Steps:**
    - Create laser-level terraces with 0.5% gradient
    - Plant vetiver grass on embankments
    - Alternate strips of cereals and legumes
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## 6. Moroccan Organic Techniques

- **Certification Requirements:**
    - Conversion Period:
      - Annual crops: 3 years
      - Perennials: 5 years
  - **Approved Organic Inputs:**
    - Compost (up to 20 t/ha/year)
    - *Beauveria bassiana* (used for locust control)
  - **Success Story – Coop Al Amal (Essaouira):**
    - Produces certified organic argan oil
    - Achieves a 30% premium in EU export markets
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## APPENDICES

### **A1: Equipment Suppliers**

- **Drip Irrigation:** Netafim Maroc, Toro Maghreb
- **Tractors:** John Deere (Meknes), New Holland (Casablanca)

### **A2: Government Subsidies**

- **Solar Pumps:** 50% reimbursement under ADA Program
- **Greenhouse Construction:** 30–70% subsidy through PMV (Green Morocco Plan)

### **A3: Emergency Contacts**

- **ONSSA Phytosanitary Alerts:** Call 0800 00 00 77