Estimation of the production cost function and the margins realized by the phoeniculturists

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Introduction and objective

In Morocco the date palm occupied, in the 19th century, a large area of 471 thousand km2 representing almost two thirds of the national territory, with more than 15 million palm tree, at that time, Morocco occupied the 3rd rank among the producing countries and a prominent place in the foreign trade of dates thanks to the quality of its noble varieties. At the beginning of the 20th century the situation was completely reversed and the stand of the palm declined to reach 5 million palm tree of variable quality. This degradation is due to the effect of several problems in lover and downstream.

In order to contribute to the development of the phoenicultural sector, a development project has just been set up in the palm groves of Tafilalet, aiming at the integration of a new bio-fertilizing technology. In this context our research's registered whose purpose is to carry out a study on the technical and economic production system of date palm in the province of Errachidia.

méthodologique

✓ **Collecte des données**

Collection method:
Primary data: Survey of traditional phoeniculturists.

Development of a questionnaire: Identification of the operator and the operation; Technical and economic variables and harvest destination

Sampling: Goulmima "Ghris-Frkla-Amagha": 22 producers; Arfoud "Difat Ziz", 17 producers; Association of Jorf "Wahdat Jorf", 17 producers.

Data analysis: The estimation of the production cost function and the margins achieved

✓ **Theoretical approach**

Economic analysis:
- Estimated production cost = Fixed charges (Land rental; Mechanization) + Variable loads (Seasonal labor; Irrigation; Fertilization; Pollination; Phytosanitary protection).
- Estimated net margins = Sale price - gross margins

Econometric analysis:
- To detect the inputs that influence the cost of production.
- It is presented in the following explicit form : **TC=f (Y,Xi).**
   The functional form chosen: $Log(TC) = A_0 + A_1*Log(Y) + \sum A_i*Log(X_i) + e_i$

Results achieved

✓**Economic analysis**

Estimated cost of production

	Average (Dh/pied/an)	Coefficient of variation (%)	% Fixes Costs	% of production cost
Utilization of irrigation system cost	65	136	76	25
Utilization of solar panel cost	8,8	92	10	1
Land rental cost	11,4	128	13	5
Fixes costs (MAD/palm)	**85,17**	**129**	**100**	**32**

	Moyenne (Dh/pied/an)	Coefficient de variation (%)	% du Coûts variables	% du Coût total
Seasonal labour cost	73	76	45	32
Energy irrigation cost	20	94	12	9
Organic fertilization cost	59	100	36	26
Mineral fertilization cost	9	80	5	4
Plant protection cost	3	115	2	1
Variables costs (MAD/palm)	**164**	**54**	**100**	**68**

Estimated margins made by phoeniculturists

	Mejhoul	Boufeggous	Najda	Bouslikhane	Bouskri	Khalts
Average yield (Kg/palm)	50	59	55	113	60	106
Average selling price (dh/kg)	67	34	8	18,2	10	15
Gross margin (MAD/kg)	63,6	33,6	7,54	17,5	10	14
Net Margin (MAD/kg)	**62**	**32**	**5,99**	**16,7**	**8**	**13,6**

✓**Econometric analysis**

Estimated production cost function (MAD/kg)/palm

Source	Coefficients	Standard Error	T (student)	Pr > |t|
Constant	0.938	0.179	5.244	< 0.0001
Yield	-0.886	0.071	-12.426	< 0.0001
Land	0.154	0.044	3.520	0.001
Seasonal labour	0.314	0.061	5.186	< 0.0001
Irrigation	0.073	0.027	2.659	0.011
Organic fertilization	0.109	0.030	3.662	0.001
Mineral fertilization	0.035	0.042	0.834	0.409
Pollination	0.025	0.080	0.308	0.760
Phytosanitairy	0.031	0.046	0.669	0.507
R²	0,916			
Adjusted R²	0,898			
F- statistic	49,192			
probability (F-statistic)	< 0,0001			

- The model as a whole is significant: 0.0001 <0.05
- Thus the model explains 89% of the variability in the average cost of production
- **The constant and the variables of the yield; the cost of renting the land; seasonal labor; and organic fertilization are variables correlated with the explained variable average cost.**
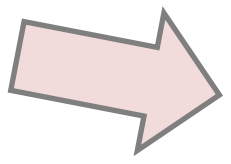
Cost of production function →
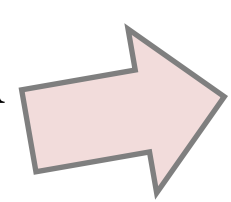
LCm = 0,938 - 0,886Log(yield) + 0,154 Log (land) + 0,314Log (seasonal labour) + 0,109Log (organic fertilization)

➢ A decrease in the seasonal labor cost of one unit would decrease the average cost by 0,314 unit;
➢ Similarly, a decrease in the cost of organic fertilization of a unit would result in a decrease in the average cost of 0,109.

Scale returns are decreasing: Increase in unit yield

Decrease in average cost of production by almost 0,886

Conclusions and recommendations

➢ To conclude, the net margins are very important for the Mejhoul and Boufeggous varieties.

- Yield: 50 kg/palm;
- Production density of 100 feet / ha; → **310 000 MAD/ha**
- Net margin: 62 MAD/kg

➢ This benefit can be further improved if producers improve their date production system.

Scale returns are decreasing (elasticity = -0,886), it is necessary to improve the current practices of producers by approaching the recommended technical optimum; in particular the variable of organic fertilization:

Opération	Recommander	Pratiqué
Fertilisation organique	150 kg/palm/year.	51 kg/palm/year.

Develop organic farming through support farmers on integrated protection techniques and organic date palm

In relation to the cost structure: Taking into account the cost of production in the sale price. Farmers can promote Moroccan varieties by administering suitable prices during Ramadan/festivity

References
www.fertiledatepalm.net; FAO (2014) FAOSTAT. FAO, Rome, Italie.

Swiss Programme for Research on Global Issues for Development

In light of global challenges, the Swiss Agency for Development and Cooperation (SDC) and the Swiss National Science Foundation (SNSF) launched in 2012 the joint «Swiss Programme for Research on Global Issues for Development» (r4d programme). The main goal of the r4d programme is the generation of new knowledge and the application of research results that contribute to solving global problems and securing public goods in low- and middle-income countries within the framework of global sustainable development. The r4d programme consists of six modules, five with thematic priorities and one for thematically open calls. www.r4d.ch