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SUMMARY – More than ten years of experiments on almond growing at Harran Plain in _anlıurfa have shown that there is a safe and big potential for almond production in this region. The soils are deep and fertile, high quality irrigation water is available now, late spring frost are not existing. Dry and warm summers, late autumn rains offer big advantages for almond growing. Therefore here, drying, dehulling, shelling, storing and transportation of almonds are much easier in comparison to the other parts of the country. Last year an experiment (TAGEM/BB/98/05/03/001) was started with about 25 almond cvs (Turkish, French, Spanish, Italian, Russian and American) in 3 locations at Harran Plain and 4 sub-regions in the southeast Anatolia and eastern Mediterranean area. The cvs were budded on almond rootstock and the plants were planted in February-March, 1999. Another experiment was established in February 1999 by a private firm (NURMET) with 3 Spanish (Masbovera, Glorieta and Guara) and 3 French (Lauranne, Ferragnes and Ferraduel) cvs budded on GF-677. All the plants are irrigated by drip irrigation. Their growth are being measured by regular intervals. In most of the experimental places developments of the young trees are satisfactory.

Key words: Almond, southeast Anatolia, culture.

RESUME – *"L'Anatolie du sud-est peut être une importante région de culture d'amandiers en Turquie". Plus de dix années d'expérimentations sur la culture de l'amandier dans la plaine de Harran à _anlıurfa ont montré qu'il existe un grand et solide potentiel pour la production d'amandes dans cette région. Les sols sont profonds et fertiles, une eau d'irrigation de haute qualité est maintenant disponible, et il n'y a pas de gelées de fin de printemps. Les étés chauds et secs, les pluies en fin d'automne offrent de grands avantages pour la culture de l'amandier. Donc ici, le séchage, émondage, décorticage, entreposage et transport des amandes est bien plus facile en comparaison avec les autres parties du pays. L'année dernière une expérience (TAGEM/BB/98/05/03/001) a été entamée avec environ 25 cultivars d'amandier (turcs, français, espagnols, italiens, russes et américains) dans 3 localités dans la plaine de Harran et dans 4 sous-régions dans le sud-est de l'Anatolie et la zone méditerranéenne orientale. Les cultivars ont été greffés sur des porte-greffes amandier et les arbres ont été plantés en février-mars 1999. Une autre expérience a été mise en place en février 1999 par une firme privée (NURMET) avec 3 cultivars espagnols (Masbovera, Glorieta et Guara) et 3 cultivars français (Lauranne, Ferragnes et Ferraduel) greffés sur GF-677. Toutes les plantes ont reçu une irrigation goutte-à-goutte. Leur croissance a été mesurée à intervalles réguliers. Dans la plupart des sites expérimentaux, le développement des jeunes arbres a été satisfaisant.*

Mots-clés : *Amandier, sud-est de l'Anatolie, culture.*

Introduction

Although there are many suitable ecologies for almond production in Turkey the farmers are afraid of planting almond for 4 main reasons: (i) spring frosts; (ii) lack of suitable, high quality, high yielding, late flowering, true to name nursery plants; (iii) planting losses; and (iv) pollination problems. Due to the spring frosts the almond trees planted here and there, apart from the Mediterranean and Aegean Coastal areas, are not given fruits with the exception of unusual years. Since almost all of the almond trees were grown as seedling trees, people are not aware of the existence of late flowering cvs. In Central Anatolia there are vast areas of seedling almond plantations in the State Farms but these where planted there for afforestation of those dry lands where annual precipitation is about 250 mm. Almond was chosen tree species because of its drought resistance. But for many years both its production and number of trees in Turkey went on stable which where about 40,000 tons and 4,000,000 trees, respectively. Out of this production 11.59% comes from the southeast Anatolia (Table 1). It corresponds 5.4 thousand tons. That means almond is not a new fruit in the region. If we study Table 2, we can see that in almost all of the South East Anatolia provinces almond is more or

less grown. Number of trees is the highest in Diyarbakır (191.7 thousand trees) but the production is the highest in Mardin (1.3 thousand tons). _anlıurfa's share is very low with 48 tons which corresponds 1.08% of the whole region.

Table 1. Almond production (t) and number of trees in different region of Turkey

Regions	Number of trees			Production		
	Total	Bearing	%	Ton	%	Yield (kg/tree)
Middle north	338,730	288,557	85.19	4,042	8.60	14.0
Aegean	1,939,391	1,774,908	91.52	14,211	30.24	8.0
Marmara	107,703	98,100	91.08	1,315	2.80	13.4
Mediterranean	608,657	509,392	83.69	10,086	21.46	19.8
Northeast	24,137	21,072	87.30	167	0.36	7.9
Southeast	*553,158*	*425,173*	*76.86*	*5,447*	*11.59*	*12.8*
Black Sea	19,000	16,450	86.58	254	0.54	15.4
Middle east	537,370	380,182	70.75	5,247	11.16	13.8
Middle south	598,854	466,166	77.84	6,231	13.26	13.4
Turkey	4,727,000	3,980,000	84.20	47,000	100.00	11.8

Table 2. Almond production (t) and number of trees in the southeast Anatolia provinces

Provinces	Number of trees			Production		
	Bearing	Total	%	Ton	%	Yield (kg/tree)
Adıyaman	40,000	50,369	9.31	580	13.09	11.5
Batman	23,040	33,400	6.51	409	9.23	17.8
Diyarbakır	146,075	191,676	37.35	1,218	27.48	8.3
Gaziantep	12,300	14,550	2.83	82	1.85	6.7
Kilis	3,000	5,000	0.97	30	0.68	10.0
Mardin	107,601	122,181	23.81	1,317	29.72	12.2
_anlıurfa	10,310	12,330	2.40	48	1.08	4.7
_ırnak	21,110	42,900	8.36	528	11.91	25.0
Siirt	37,400	40,750	7.94	220	4.96	5.9
Total	400,836	513,156	100.00	4,442	100.00	11.3
Others	3,424,164	3,988,844	–	38,568	–	11.3
Turkey	3,825,000	4,502,000	–	43,000	–	11.2

Only a few cvs of almond such as Nonpareil, Texas and Drake were introduced about 15 years ago. Nursery plants of these cvs are being budded on almond seedlings. In transplanting times they are giving difficulties due to their tap roots. The yields of the mature trees are low because of spring frosts, lack of pollination, pruning and fertilization.

After trying modern almond cvs at the Cukurova University from the years of 1975 (Ka_ka *et al.*, 1996), after about 12 years ago we have started an experiment at Harran Plain with Nonpareil, Drake, Texas and 3 late flowering Turkish cvs (101/9, 101/13 and 101/23) (Dokuzo_uz and Gülcan, 1973; Ka_ka *et al.*, 1998). Later on Ferragnes, Ferraduel, Genco, Picantily, Yaltinsky and 3 early flowering Turkish cvs (48/1, 48/2 and 48/5) were added to the experiment (Küden, 1997).

Another experiment was arranged in Ceylanpınar State Farm which is situated on the eastern part of _anlıurfa. In this farm dry farming is predominated but this experiment was established on an irrigated part. Here with the exception of newer Spanish and French cvs almost all the cvs which exist at Harran Plain were planted and they are flood irrigated. The results with especially late flowering cultivars are satisfactory.

These experiments have shown that almond is a correct choice for the southeast Anatolia. Therefore when high quality of irrigation water has flown from Ataturk Dam, we have started another adaptation experiment (TAGEM/BB/98/05/03/001) at Harran Plain with about 25 cvs in which Turkish, French, Spanish, Italian, Russian and American cvs were used. On the other hand a private firm (NURMET) established 17.5 ha almond orchard with 3 Spanish (Masbovera, Glorieta, Guara) (Felipe and Socias i Company, 1987; Vargas and Romero, 1993) and 3 French cvs (Ferragnes, Ferraduel and Lauranne) (Grasselly and Duval, 1997) in the northern part of Harran Plain. With the exception of Ceylanpınar State Farm, all the experimental plants are irrigated either by drip or mini spring irrigation systems.

Why almond growing at Harran Plain?

Harran Plain has very hot and dry weathers in summers. Although high quality apricot, plum, strawberry, grape, etc. can be grown here, since they are perishable fruits, after harvest they loose weight (due to the water loss), they shrivel and because of the chemical changes at high temperatures they loose quality. For these reasons table fruits can only be grown here for local markets.

Presently cotton, wheat, corn and water melon are the predominantly grown crops at Harran Plain. It is very well known that horticultural crops are much more economical than the field crops. On the other hand in such a very hot climate these field crops consume too much water and we are afraid that it will result with salinity in the future. This last point is much more important for Harran Plain than the economics of the crops.

As it was mentioned above, the almond adaptation experiments carried out at Ceylanpınar State Farm and Koruklu experimental field at Harran Plain have given successful results. Main advantages of growing almond in Harran Plain are: (i) easy drying of harvested nuts, storing them in conventional stores and their transportation by normal trucks; (ii) although the fat content of almond is quite high (>50%), rancidity is not common; (iii) due to the very high and stable prices almond growing will be much more profitable than any other crop; and (iv) almond shell is a nice burning material for the poor people.

As far as the spring frosts are concerned Harran Plain can be considered as a safe place. We came to this conclusion after 12 years of almond adaptation works here. We obtained almonds even from early flowering 48/5, 48/1 and 48/2 (Turkish cvs) and Nonpareil almost every year during the 8 years period. Since the spring frosts did not give important damages to almond crop in this area for about 8 years, growing of this very valuable nut will be very profitable for the local farmers and Turkish economy. Availability of irrigation water, fertility of soils, suitability and availability of high quality and high yielding cvs can make Harran Plain Turkish California for almond production. Thus imitating the almond program of USA during the years of 1925-50 and its accelerated program in 1980 and by using modern horticultural techniques (irrigation, pruning, nutrition, plant protection, etc.) Turkey can be an important almond producer in the Mediterranean basin. We can also add that by using low-tension modern irrigation techniques, we can save irrigation water for the other places in the GAP region.

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