

PLASTICS EMPLOYED IN UNDERCOVER GROWING IN TURKISH AGRICULTURE WITH A PARTICULAR ATTENTION TO THE ANTALYA REGION AND THE PROSPECT OF PLASTICS USE

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SUMMARY

This research was conducted to find out the types and quantities of plastics used in undercover growing in Turkish agriculture with a particular attention to Antalya region which contains about 57% of the country's total greenhouse area. The total amount of plastics used is estimated to be around 83397 tons, looking at the figures of the present undercover area in the country. There are seven large companies, some of them situated in Antalya, manufacturing plastics not only for Antalya but also for the whole of the country.

It is evident from the result of this simple investigation that the range of plastics produced by these companies changes from 6-months clear plastics to 3-years UV-added plastics. Within this range is the IR+UV+antifog material-added plastics which is gaining some employment popularity in undercover growing. It seems that the production and the market share of the UV+IR and UV+IR+antifogging material-added plastics will show a tendency towards quite considerable increase in the next decade or so.

KEYWORDS: Plastics, Turkish agriculture, undercover growing

INTRODUCTION

Undercover growing constitutes an important part of the Turkish agriculture, where the climatic conditions favour such growing techniques.

Antalya Yöresi Başta Olmak Üzere Türk Tarımında Örtüaltı Yetiştiriciliğinde Kullanılan Plastikler ve Gelecekteki Plastik Kullanımı

ÖZET

Bu araştırma, Türk tarımında örtüaltı yetiştiriciliğinde, özellikle Türkiye toplam sera alanının %57'sinin bulunduğu Antalya yöresinde kullanılan plastiklerin tip ve miktarlarının belirlenmesi amacı ile yürütülmüştür. Buna göre, Türkiye toplam örtüaltı alanı dikkate alındığında toplam 83397 ton plastik kullanıldığı görülmektedir. Antalya yöresinde, hem bu yöreye hemde tüm ülkeye yönelik plastik üretimi yapan 7 adet firma mevcuttur.

Araştırma sonuçlarına göre, üretilen plastiklerin 6 aylık polietilenden 3 yıllık UV+IR katkılı plastiğe kadar değiştiği ve bazı firmaların UV+IR+anti-fog katkılı plastikleride ürettiği belirlenmiştir. Mevcut tüketim eğilimi dikkate alındığında, bu son plastiklerin gelecek yıllarda örtü malzemesi olarak pazar payını büyük oranda artıracakları söylenebilir.

ANAHTAR KELİMELER: Plastikler, Türk tarımı, örtüaltı yetiştiriciliği

The so-called undercover structures in which various crops are cultivated can be classified in two groups: greenhouses and low tunnels.

Of these, plastic covered greenhouses, including high plastic tunnels are of interest to us for the sake of present study.

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As will be explained later on, about 77% of the greenhouses and about 90.2% of the whole undercover growing area in the country are covered by various types of plastics. Therefore, there appears to be a great need for the exhibition of the status of undercover areas in terms of the quantity and type of plastics used, as precise as the collected data allow. This study aims to achieve such an objective and look at the future plastic use tendency in the country.

UNDERCOVER AREAS

The data on the existing greenhouse and total undercover area were all supplied by the Antalya Branch of the Ministry of Agriculture and Rural Affairs. The percentages of the undercover areas as of the total were then calculated from these data.

Leading plastic manufacturers located or represented in Antalya and

thereabouts were visited by person and the rough data related to the types and prices of the plastics produced and the most popular ones with the consumers were obtained. These data, however, will not of course be definitive since both they give the approximate values and they were not willing to give exact details at times, probably due to competition with each other. In spite of these, the data collected, we believe, will be of great utility to both plastic manufacturers themselves and to the researchers who might have interest on the subject.

Present Size of the Undercover Area

The present undercover area in Turkey is about 37000 ha and about 90.2% of this area is covered by plastics, as indicated by the table 1 (1,2), values in parenthesis showing the percentages in total.

Table 1. Distribution of the undercover area in Turkey (ha)

Structure	1994-1995	1995-1996
Glass	3208.56 (9.2)	3597.13 (9.75)
Plastic	11311.9 (32.5)	11846.10 (32.1)
Low Tunnel	20276.04 (58.3)	21421.29 (58.1)
Total	34796.51 (100)	36864.52 (100)

The table shows that, whilst total areas of the glass covered greenhouses increased slightly in 1995-1996 period, size of the plastic covered ones decreased though not in the same order of magnitude. This might be due to the conversion of plastic greenhouses into glasshouses. Antalya, where this study was performed, is a highly important city with its districts, for it owns about 80.1% of the glasshouses and 50.55% of the plastic greenhouses of the related total area in the country, as depicted in table 2 for 1995-1996 period in

comparison with some other cities with less greenhouse density (2).

The city's share of the glass and plastic greenhouses as that of the percentages of the total greenhouse area (i.e. glass+plastic) is 18.8% and 38.77%, respectively. A comparison with the 1994-1995 data reveals that the glass and plastic covered greenhouse areas increased by 12% and 5.8%, respectively, and the area reserved for low plastic tunnels decreased by 14.8%. This decline in the

Table 2. Share of some cities in the undercover area in Turkey (ha).

City	Glass	Plastic	Low Tunnel	Total
Muğla	348.3	1331.7	472.8	2152.8
İzmir	31.25	433.2	67.83	532.28
İçel	254.9	3488.8	21345.6	5879.3
Antalya	2882.2	5988.6	1576.0	10446.6

size of the low plastic tunnels is not surprising since the surplus area might have been converted to either greenhouses or building construction for purposes other than undercover growing.

The high density of greenhouses and the quite extensive undercover growing activities in Antalya are the main causes that keep the leading

plastic manufacturers of the country at bay and enlarging.

Plastic Manufacturers and Product Ranges

In the context of this research, the data collected from some companies are presented. Table 3 shows the product ranges and the prices.

Table 3. Plastics produced and 1996 prices on US dollar/kg basis.

Company	1-year ^a	2-year ^b	3-year ^c	2-year(IR added) ^d
Ystan. Sera Pl.(3)	1.7	2.1	2.3	2.4
Keskin Plastik(4) ^e	1.7	2.2	-	2.4
Vatan Plastik(5) ^f	2.1	2.3	2.5	-
Verim Plastik(6) ^g	1.7	2.1	2.25	2.3

^a : 2% UV added, ^b : 5% UV added, ^c : 8% UV added (UV additive imported from mainly Switzerland-15DM/kg), ^d : for example, about 2% IR+3% UV (what the manufacturers call "plastic with heater").

^e : row material from a government establishment (PETKYM- $\$$ 1025+VAT/ton)

^f : 2-year plastics(0.2-0.4) produced as well for use as thermal screen

^g : 0.3mm UV+IR+Antifog added plastics($\$$ 2.5/kg), row material from Spain.

All manufacturers consistently stressed that plastics without additives are out of use in undercover growing and that great part of their market shares are secured by the 2-year plastics (or sometimes called 18 months plastics) sold. They also hesitate to introduce the IR added plastics into the undercover cultivation since they believe that the IR addition creates a drawback in terms of the life of the plastics, just like the chemicals, despite this plastic cover keeping the infra-red heat waves inside the structure. In such a case, keeping the IR percentages always lower than that of UV offers a solution to the problem to some extent.

The plastics produced are mostly 4 to 8 m wide and 50, 60 and 80m long. UV+IR added plastics are manufactured on special order. Market shares of the leading plastic manufacturers in the whole of the country are as follows, as supplied by (5):

	%
Vatan Plastik	36
İmece Plastik	20
Bereket Plastik	3
Verim Plastik	6
İstanbul Sera Plastik	6
Naksan(G.Antep)	3
Keskin Plastik	3

Here, İmece Plastik is an establishment of the Agricultural Credit Co-operation. These values are certainly not the definitive ones but at least they could be used to predict the approximate amount of plastics manufactured in the country by these companies.

Estimated Extend of Present Plastic Use

Present quantity of plastic use in undercover growing can be predicted to some acceptable degree of accuracy based on the existing area as depicted in table 1. Here, This is achieved by considering the circular low tunnels with an average size of 100m² ground

area(2*50m) giving a cover area to ground area ratio of 1.6, and by assuming the plastic greenhouses (including high tunnels) as of circular shape with an average size of 1da(20*50) resulting a cover area to ground area ratio of about 1.88. After estimating the total area of plastics used, by introducing a plastic mass of about 0.15 kg/m² of plastic and multiplying this by the total area, one can obtain the amount of plastic used on a, say, 2 year basis if 2-year plastics are assumed to be used. In terms of the total monetary activity, other plastics will effect the outcome by about ±10 Cent. Table 4 shows the result of this calculation for both the country and Antalya.

Table 4. Estimated plastic area(m²) and the amount used (tons).

Place	Tunnels		Greenhouses	
	Cover area	Amount	Cover area	Amount
TURKEY	342750400	51412.5	213229800	31984.47
Antalya	-	3782.4	-	8982.9

It will be seen from the table that the total estimated plastic use amounts to about 83397 tons in the whole of the country. By looking at these data, there is even no need to stress the size of the monetary activity in the field. By investigating the percentage shares of the companies in plastic production, as indicated in previous sections, it is clear that either about 23% of the plastics are produced by some unpronounced companies throughout the country or those percentages, somehow do not reflect the reality. During the course of this investigation, it was observed that the amount of plastics sold in Antalya by the aforementioned companies were much lower than what it should have been as the values in table 4 imply. This could be attributed to that either the producers were not willing to supply us with the correct sales figures or the

farmers use their plastics longer than the indicated lifetime of the plastics.

Conclusions and the Prospect

It seems that the undercover growing areas increase steadily in Turkey. This means that larger amounts of plastics will be utilised in the future. The plastics extensively used are of 2 years lifetime, though longer-lived plastics seem to be good candidates as well as the IR added ones. Future studies should be directed towards the determination and modification, if necessary, of the thermal, lifetime and light transmission properties of these plastics.

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