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MARA

EXPERIENCES ON TRANSFER OF MANAGEMENT OF TECHNOLOGY FOR ASCOCHYTA BLIGHT OF CHICKPEA IN TURKEY

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ABSTRACT: ***Ascochyta*** *blight (AB) is the most important biotic stress factor in Turkey. Several methods of controlling this disease such as application of fungicides, adjusting sowing time, together with* ***ascochyta*** *blight-resistant varieties have been suggested.Considering resistant cultivars is the most effective way controlling the disease. Up to date, some resistant and tolerant chickpea cultivars have been registered besides the susceptible cultivars as a result of breeding studies. Transfering reseach findings to farmers is an important as gathering these results.*

On farm-trials (OFTs) and demonstrations were conducted in Aegean, and South Eastern Anatolia to transfer these varieties to farmers. The small-seeded AB resistant varieties, although performed well under AB epiphytotic conditions, were not accepted by farmers since they prefer large-sedeed types. However newly registered varieties with an acceptable seed size, are expected to be utilised in chickpea growing areas. The results of OFTs conducted in Aegean region confirm this.

Keywords: *Chickpea,* ***ascochyta*** *blight, demonstrations and on farm-trials*

INTRODUCTION

Turkey is one of the major chickpea producer and the leading exporter in the world. Chickpea is grown in almost all regions of the country except few provinces. Kabuli types of chickpeas predominate production mainly because of consumer preference. Over the period from 1985 to 1995, both area and production in the country have increased nearly two times (TSAS, 1985-1995). Much of this increase has come from the replacement of the follow. As a consequence of this increase, chickpea has become an important export item.

There are several factors considered to be limiting the productivity of chickpea. *Ascochyta blight* of chickpea caused by *Ascochyta rabiei* is the most important biotic stress factor. Being the most destructive and widespread disease of chickpea in Turkey, it attacks all aerial parts of the plant; causing leaf, stem, branches and pod lesions. In some years severe yield losses occur depending on the climatic conditions.

Infected seeds and plant debris are important sources of primary inoculum for AB of chickpea. Since the local cultivars are susceptible to ascochyta blight, and chickpea farmers usually reserve seeds from their own production for the following year; some infected seeds planted in the fields cause a random distribution of the pathogen and primary infection foci in the field. When the climate is highly favourable for blight development, the pathogen can spread rapidly from these foci. Maden et al (1975) detected the fungus in 70 % of the chickpea seed samples from Central Anotolia, with seed infection ranging from 1 to 16 %. According to a similar study conducted in Aegean region the percentage of infected seed was between 48 and 65 % and the average presence of the fungus in each sample was 1.6% (Yýldýz and Delen 1978).

Plant debris are also important in the survival of the pathogen from one season to the next and as a source of infection for following chickpea plantings.

CURRENT STATUS OF THE DISEASE CONTROL

Cultural practices

Crop rotation and sequence, deep sowing, burial of crop debris deep in the soil, removal and the destruction of infected plant debris, late sowing is recomended as methods to reduce the blight incidence. The most common one is the late sowing. Chickpea is traditionally grown in Turkey in dry areas without the benefit of irrigation. Since temperature and humidity are critical factors for blight development, farmers prefer late sowing in spring, usually before the end of May so that the crop can escape from Ascochyta blight. Late sowing, affects ascochyta blight incidence but decreases the crop yield, because of the high temperature and drought.

Seed treatment

Seed-borne inoculum of the pathogen is the most important primary source of inoculum for blight development. Fungus reduces seed germination and seedling vigour. Seed treatment improves the seed quality and eradicates the seed-borne inoculum. Several fungicides recommended for seed treatment are listed in Table 1.Thanks to seed dressing; transporting ascochyta blight from one season to the following, and spreading it from one area to another is prevented.

Table 1. Seed dressing fungicides for ascochyta blight.

A. i. content	Formulation	Dosage (gr/100 kg seed)
Mancozeb 80	WP	200

Maneb 80	WP	200
TMTD 80	WP	300
TMTD 85	WP	200

Source: Registered Agrochemicals in Turkey, 1993.

Foliar application

It is recommended to use fungicides once the disease has appeared in the field. Under favourable conditions on susceptible cultivars, disease development is very fast and fungicide applications are usually ineffective or, too much treatment is required for significant reduction in disease. All of these above mentioned points limit fungicide use in Turkey. In general, farmers are not willing to apply the fungicides, due to economic reasons.. The amount of the fungicides used and area sprayed for AB between 1990-1994 is in Turkey is given in Table 2. The insufficient use of chemicals for AB is also noticeable in country wide. Fungicides recommended for blight control are given in Table 3.

Table2. Fungicides used for AB in 1990-1994.

Year	Amount (tons)	Area (ha)
1990	22,290	24,566
1991	22,574	16,590
1992	20,280	18,191
1993	19,722	20,441
1994	20,720	23,232

Table 3. Recommended foliar sprays for ascochyta blight.

A. i. content	Formulation	Dosage
Chlorothalonil 75	WP	200 gr
Sulphur 92-98	Dust	30 kg /ha
Sulphur 80	WP	300 gr
Mancozeb 80	WP	200 gr
Maneb 80	WP	200 gr
Propineb 10	Dust	40 kg /ha
Propineb 70	WP	200gr

Source: Registered Agrochemicals in Turkey, 1993.

Resistant cultivars

Considering resistant cultivars is the most effective and economic way of controlling the disease. National research institutes have conducted breeding programs for the development of large seeded AB resistant cultivars. Up to date some resistant, and tolerant varieties have been registered besides the susceptible cultivars, as a result of breeding studies (Table 4). As seen from the table, seven of these eleven cultivars are resistant to AB.

Table 4. Released chickpea cultivars.

Cultivar	Institute	Year	AB reaction.
Canýtez 87	FCIC	1987	HS
Eser 87	AUAF	1987	MS
ILC 195/2*	AARI	1987	R
ILC 482	SEARI	1991	R
Akçin 91	FCIC	1991	MS
87 AK 71112*	FCIC	1991	R
Aydýn- 92	AARI	1992	MR
Menemen - 92	AARI	1992	MR
Izmir - 92	AARI	1992	MR
Damla 89	BARI	1994	MS
Aziziye 92	EAARI	1994	R

* registered temporarily.

FCIC: Field Crop Improvement Center AUAF: Ankara University Agricultural Faculty AARI: Aegean Agricultural Research Institute SEARI: South Eastern Agricultural Research Institute BARI: Black Sea Agricultural Research Institute EAARI: Eastern Anatolia Agricultural Research Institute R: resistant MR: moderately resistant T: tolerant MS: moderately susceptible S: susceptible HS:highly susceptible.

Additionally, eight promising lines are being tested in registration yield trials. Most of these improved cultivars have desirable traits such as tallness, erectness, and high yield potential in addition to resistance to AB.

ON FARM-TRIALS

Transferring research findings to farmers is as important as gathering these results. On-farm trials and demonstrations are the only effective way for informing the farmers about the new technology. They are programmed in selected farmers' fields and carried out together with the researcher, extensionist, and the selected farmer. The on-farm trial aims verifying the technology under farmers' conditions using research management .

Chickpea OFTs involving the resistant cultivars, as detailed in the following, have been conducted by agricultural research institutes in different regions. The starting point for assessing the OFTs is demonstrating the resistance to ascochyta blight disease, yield performance and other good traits of the cultivars.

Cv. ILC 195/2

On - farm trials involving this cultivar were conducted in 1986 and 1987 (Table 5). In 1986 and 1987 the damage of ascochyta blight was severe in Aegean region and farmers had the chance to compare ILC 195/2 with their local cultivars. The reason why farmers accepted ILC 195/2 based completely on the resistance to AB of chickpea and great amount of seed was on demand. In the following three years; 5, 4, and 13 tons of certified seed of this cultivar was distributed to farmers respectively. In the course of time, there was a considerable decrease in seed demand for this cultivar because of the small seed size. Because consumers' preference is always on the favour of large seeds.

Table 5. OFT results of Cv. ILC 195/2.

	ILC 195/2				Ýspanyol population	
	Sowing date	Plant height cm.	Yield kg/ha	Blight reaction	Yield kg /ha	Blight reaction
	1	9	8	6		
Manisa-Soma	16.12.85	58	1770	R	0	HS
Balýkesir-Merkez	19.12.85	45	1200	MR	0	HS
Denizli-Acýpayam	13.03.86	40	1100	R	180	HS
Denizli-Çal	25.03.86	42	1420	R	430	S
	1	9	8	7		
Denizli-Çameli	9.04.87	35	115	R	35	MS
Çanakkale-Yenice	10.04.87	55	156	R	147	T
Çanakkale-Çan	8.05.87	42	105	R	60	S

R: resistant MR: moderately resistant T: tolerant MS: moderately susceptible S: susceptible HS:highly susceptible

Cv. ILC 482

Cultivar ILC 482 is resistant to ascochyta blight in South Eastern Anatolia. Results of OFTs conducted with this cultivar in 1987 is given in the Table 6. It had much better yield than the local population did and early planting had had a yield advantage compared to the traditional late planting. However, farmers' opinion did not change because of its seed size, although this cultivar has still some acceptable traits.

Table 6. OFT results of Cv. ILC 482.

Cultivar	ILC 482 (kg /ha)		Local pop.(kg/ha)
Location	February	April	April
Mardin-Midyat	1400	1350	1240
Mardin- Mazýdað	950	430	520
Urfa- A.Kýrca	960	850	550
Urfa- Merkez	2620	1450	1100
Urfa-Payamlý	750	400	300

Experiences from above mentioned OFTs clearly indicated that large seeded chickpea cultivars have always a distinct advantage over the small seeded cultivars such as ILC 195/2 and ILC 482.

Seed production and distribution of these two cultivars are given in Table 7.

Table 7. Seed production and distribution of Cvs. ILC 195/2 and ILC 482.

Cultivar	1993		1994	
	Production*	Distribution*	Production*	Distribution*
ILC 195/2	39	21	57	44
ILC 482	2	2	2	-

* tons

Cvs. Ýzmir 92, Menemen 92, and Aydýn 92

All of these cultivars are high yielding, resistant to AB with an acceptable seed size. On farm trials involving these cultivars have started in 1993 and since then they have been continuing in Aegean region (Table 8).

Table 8. OFT results with Cvs. Ýzmir 92, Menemen 92, and Aydýn 92.

Cultivar	1993			1994	
	Yield (kg /ha)	Blight reaction	100 seed weight(gr)	Yield kg /ha	100 seed weight (gr)
Ýzmir 92	1080	MR	43	1180	42
Menemen 92	930	MR	45	1290	45
Aydýn 92	940	MR	36	1300	36
Canýtez 87	640	S	45	1530	49
ILC 195/2	840	R	27	-	-

R: resistant MR: moderately resistant S: susceptible.

Results related to Cvs. Ýzmir 92, Menemen 92, and Aydýn 92 have also confirmed with the results coming from the other regions. Eight promising lines have also been tested in OFTs at the same location and years (Table 9).

All of these cultivars and promising lines meet the consumers' preference, they have a chance of being planted in large areas. This has been also supported by the demand for these cultivars. It is predicted that these cultivars will be extensively utilised in chickpea growing areas when needed seed amount is achieved in the following years.

Table 9. Results of promising lines of OFTs.

Cultivar	1993			1994	
	Yield kg /ha	Blight reaction	100 seed weight (gr)	Yield kg /ha	100 seed weight (gr)
FLIP 85-1C	1070	MR	54	1180	53
FLIP 85-5C	1320	MR	44	1270	46
89 ETA 413	1150	MS	48	1550	49
89 ETA 107	1090	R	44	1410	43
89 ETA 311	1130	R	44	1400	44
89 ETA 106	1140	R	42	1250	41
89 ETA 317	1110	R	46	990	46
89 ETA 110	1070	R	41	930	43
Canýtez 87	640	S	45	1530	49
ILC 195/2	840	R	27	-	-

R: resistant MR: moderately resistant T: tolerant S: susceptible.

CONCLUSION

It seems that none of above-mentioned methods of controlling disease seems to be individually effective enough yet. In order to obtain a good yield, it will be necessary to implement an integrated program to control AB including resistant cultivars; use of healthy, ascochyta-free certified seed; seed treatment and foliar application; and following cultural practices to reduce inoculum and disease severity.

In terms of AB resistant cultivars, small-seeded types have very little chance for production. Efforts must be concentrated on developing both large-seeded and AB resistant cultivars, and transferring these technics through OFTs and demonstrations. The numbers of OFT, covering new technologies should be increased. The advantage of winter or early spring planting of the AB resistant cultivars should clearly be demonstrated under farmers' conditions.

Seed production program for each cultivar is also necessary for providing the healthy and ascochyta-free seeds to farmers. The importance of using healthy seed must be emphasised properly to farmers, thus persuading them about using the certified seed.

Seed production of susceptible cultivars must be carried out in drier disease-free areas.

Seed treatment, adjusting the sowing time and spraying foliar fungicides is necessary for the production of susceptible cultivars. Foliar applications of fungicides as well as seed dressing must also be considered for tolerant and moderately susceptible cultivars for the same purpose.

Cultural practices to reduce inoculum and disease severity should be applied for ensuring high yields.

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