EXAMPLES OF GOOD PRACTICES OF TURKEY FOR COMBATING WIND EROSION (EXAMPLES OF KARAPINAR)

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SITUATION OF DESERTIFICATION IN TURKEY

Distribution of Problem Areas in Turkey

Problem	Area (ha)
• Water Erosion	66.576.042
• **Wind Erosion**	**486.000**
• Alkaline and Salinity	1.518.749
• Hydromorphic Soils	2.775.115
• Stony and Rocky	2.930.331
• Other	894.153

WIND EROSION PROBLEM IN TURKEY

- In Turkey, wind erosion is a detrimental problem especially in southern part of the central Anatolia-(Konya-Karapınar) which is the driest zone of the country and in Kars province in the east. However, it also occurs in coastal areas.

WIND EROSION PROBLEM IN TURKEY

Provinces which cover wind eroded area

Province	Hectares
Konya	**322.474**
Niğde	122.740
Kayseri	13.894
Kars	13.510
Others Provinces	13.372
TOTAL	**485.990**

Totally 486.000 ha. Of land is subject to wind erosion varying from slight to excessive and approximately 66 % (322.474 ha) of this area is within the boundaries of Konya provinces

WIND EROSION PROBLEM IN KONYA

Situation of Wind Erosion in Konya according to erosion severity

Erosion severity	**Konya (ha)**	**%**
slight	124.521	39.61
medium	138.794	43.04
severe	56.678	17.58
very severe	2.481	0.78
TOTAL	**322.474**	**100.00**

Of the total arable land of Karapınar sub-province, roughly 300.000 ha, 103.000 ha is subject to wind erosion damages of different types and grades.

LOCATION OF KARAPINAR

BACKGROUND OF KARAPINAR

Karapınar was established by pro-Hittires and Hittites in 2000 B.C and was given the name ‘ Karapınar’ in 1934.

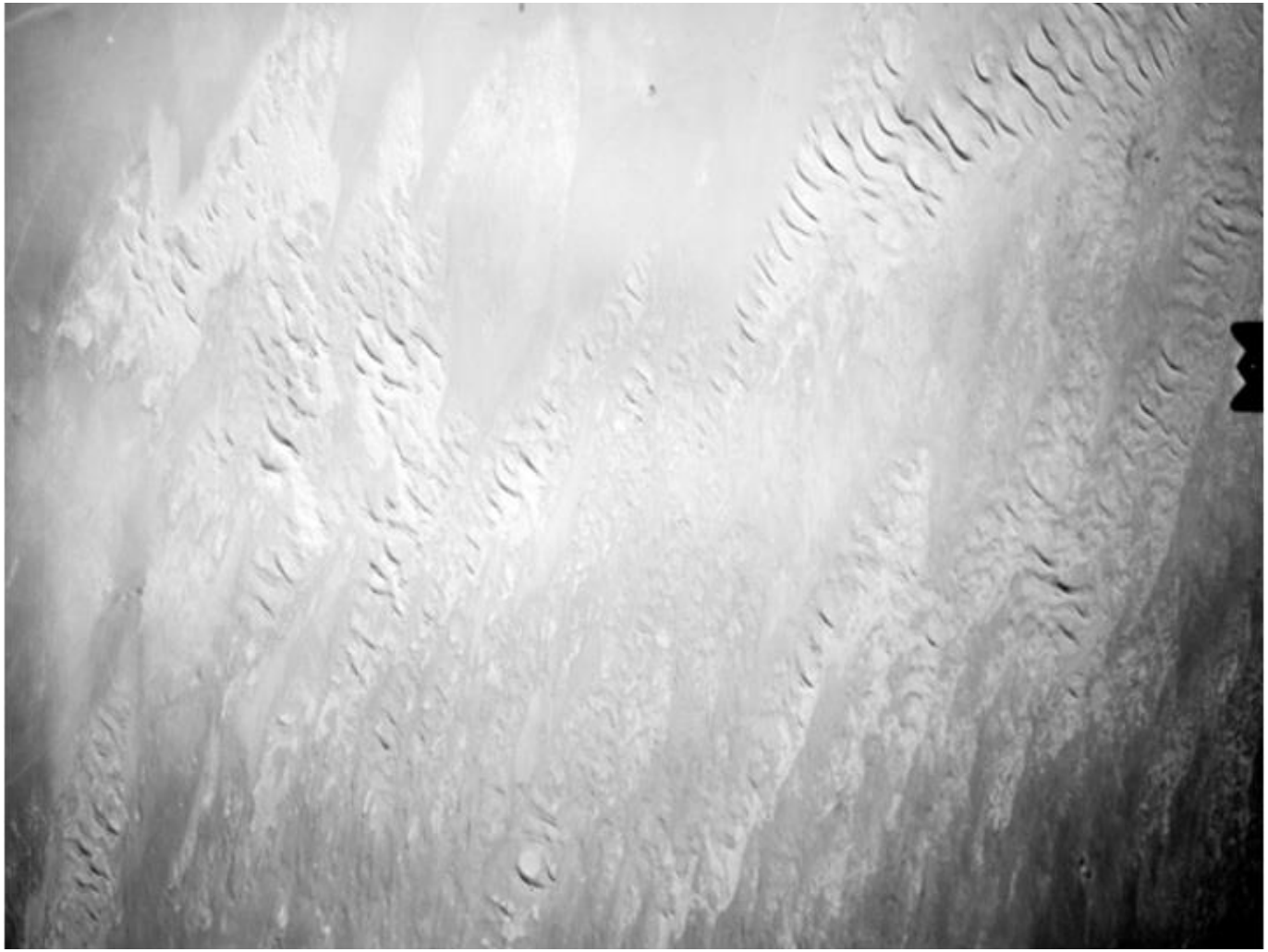
Karapınar sub-province, which is situated on Konya-Adana high-way,is at a distance of 95 km to Konya. It covers an area of 4315 square kilometers and its population is 28500.

It is bounded on the north and west by Konya plain, on the east by Karacadag and on the south by Andıklı, Küçük Kartan and Büyük Kartan hills

KARAPINAR IN 1960s

- Problem broke out in 1960 in Karapınar
- This calamity was expanding day by day and started to threaten neighbour area.

Satellite image



- Migration started from village to another places

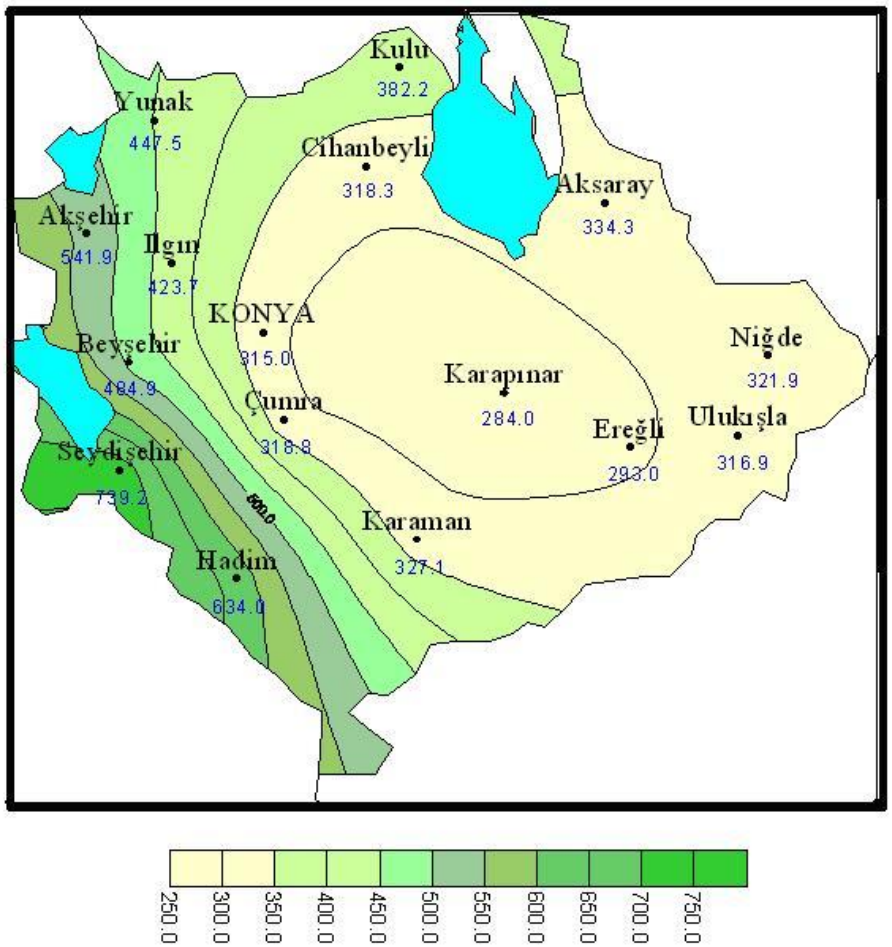
- Karapınar people were in a distressing situation and most importantly the human health was seriously effected

- Car accidents were frequent on Konya-Adana highway
- Moving the Karapınar sub-province to another place was put on the agenda but this was no economically at that time.

REASONS OF WIND EROSION IN KARAPINAR

- Climate
- Vegetative Cover
- Soils
- Geologic Formation
- Human Factors Such as :
  - Adoption of improper System
  - Crop Rotation
  - İnappropriate Land Use
  - Unsuitable Machinery and Equipment
  - Over-grazing
  - Using Some species of grass as fuel

Climate


Kulu
382.2
Yunak
447.5
Cihanbeyli
318.3
Aksaray
334.3
Akşehir
541.9
Ilgın
423.7
KONYA
315.0
Beyşehir
484.9
Niğde
321.9
Karapınar
284.0
Çumra
318.8
Ereğli
293.0
Ulukışla
316.9
Seydişehir
739.2
600.0
Karaman
327.1
Hadim
634.0
250.0
300.0
350.0
400.0
450.0
500.0
550.0
600.0
650.0
700.0
750.0

Human Factors Such as

CLIMATE OF KARAPINAR

- Mean wind direction is 3.5 m/sec annually,
- Dominant wind direction from north-east to south-west and rise to dust storms that are disagreeable and destructive.
- Stormy days are common and wind attains speeds of 20 to 25 m/sec or more.

CLIMATE OF KARAPINAR

- Average temperature is 11 ^{o}C,
- In Summer, the temperature is often between 30 and 35 ^{o}C and is occasionally above 35 ^{o}C.
- In winter, temperature falls below -20 ^{o}C or lower

CLIMATE OF KARAPINAR

- Climate of the region can be defined as Semi-arid continental, the summers are dry and have warm
- Greatest amount of snow falls in January and February,
- Average precipitation is 275 mm, about 40% falls in winter,
- The average precipitation from July through September totals only about 10 mm.

VEGETATIF COVER OF KARAPINAR

- Researches reveal that excellent grasslands and meadows once flourished here, but they were reduced to almost nothing due to overgrazing, using some grass species grass species as fuel and the destruction of meadow.

- Within the project area, there were some 140 species of flora. Some drought-resistance varieties such as speedwell, milkvetch, ground-ivy, wheat grass and thistle are capable to hold sands and materials carried by wind thus causing the formation of small dunes.

SOILS OF KARAPINAR

- The area consists of alluvial, colluvial, sieorezem and regosol soils which have a texture of light sandy loam on upper layers and of heavy clay on lower layers. They are rich in lime and potash, and poor in organic matter and phosphorous.

- The amount of sand on surface soil is very high (% 70-90)

SOIL PECULIARITY OF PROJECT SOILS

Depth cm	% sand	% silt	% clay	strücture
0-15	68,1	15,1	16,6	SL
15-30	57,2	22,7	20,1	SCL
30-60	31,0	18,0	43,0	C
60-90	16,0	24,4	59,6	C
90-120	12,5	42,3	45,2	SC

Depth (cm)	pH	% Calcareous	% Org.mat	P2O5 (Kg/da)	K2O (Kg/da)
0-15	8,1	44,7	1,9	1,145	90
15-30	8,1	48,6	1,6		
30-60	8,2	53,5	1,5		
60-90	8,3	54,6	1,3		
90-120	8	53,3	1,2		

JEOLOJIK FORMATION OF PROJECT AREA

- Surveys and researches reveal that a great part of the project area overlaps an ancient lake bed.

JEOLOJIK FORMATION OF PROJECT AREA

- This findings justifies the area that these dunes formed originally were formed by the accumulation of sands and other materials on the shores of a lake which existed in ancient times by the wind blowing over the lake towards land.

VIEWS FROM KARAPINAR IN 1960s

- The Project Area of Karapınar covers 13.000 ha which is sub-divided to different problem areas taking into consideration the nature of problems and the types of measures to be taken
  - 4300 ha of sand Dunes (Afforestation)
  - 4000 ha of Dune Shadows (Pasture)
  - 1500 ha of Bazaltic Rocks
  - 3200 ha of Dry Farming Area
    - 2000 ha of Strip-Cropping
    - 1000 ha of Farmer Area
    - 200 ha of Irrigation Area (Vineyard and Seedling Production Area)

4300 ha AREA of SAND DUNES

- This area, roughly 4300 ha, is situated on 7 km Southwest of Karapınar ,

- Land scope is that of a desert ,
- There wasn’t any vegetative cover on the dunes which are situated either individually or in chains,
- They are of crescent shape ,

- Some dunes reach 150 m at width, 240 m at length and 41 m height

PREVENTION WORKS ON 4300 ha AREA of SAND DUNES

- First Phase of Prevention Works
  - Construction and Establishment of Reed-Screen
- Second Phase of Prevention Works
  - Grassing
- Third Phase of Prevention Works
  - Afforestation

FIRST PHASE OF PREVENTION WORKS ON 4300 ha ON SAND DUNES

- Construction and Establishment of Reed-Screen
  - Reed-screen were used to reduce the velocity of wind and to stablize the sand dunes
  - Establishment of the screens counter to dominant wind direction were applied
  - Reed-Screen used in control works is at the height of 1-2 m.
  - Space between the reed-screen is 8-10 times of height of these screens.

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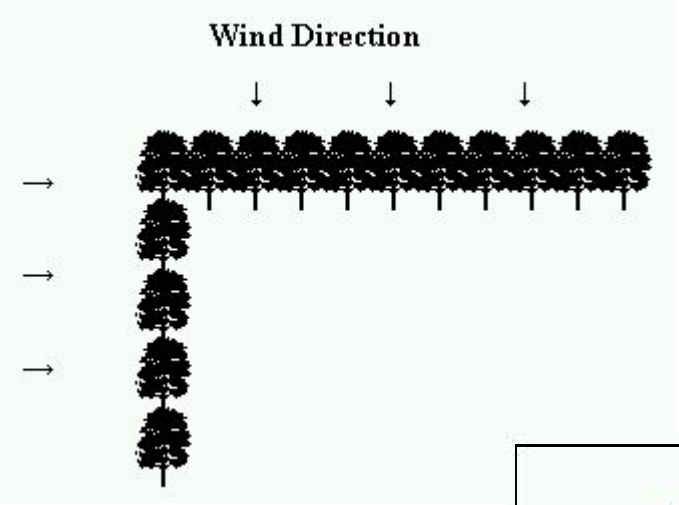
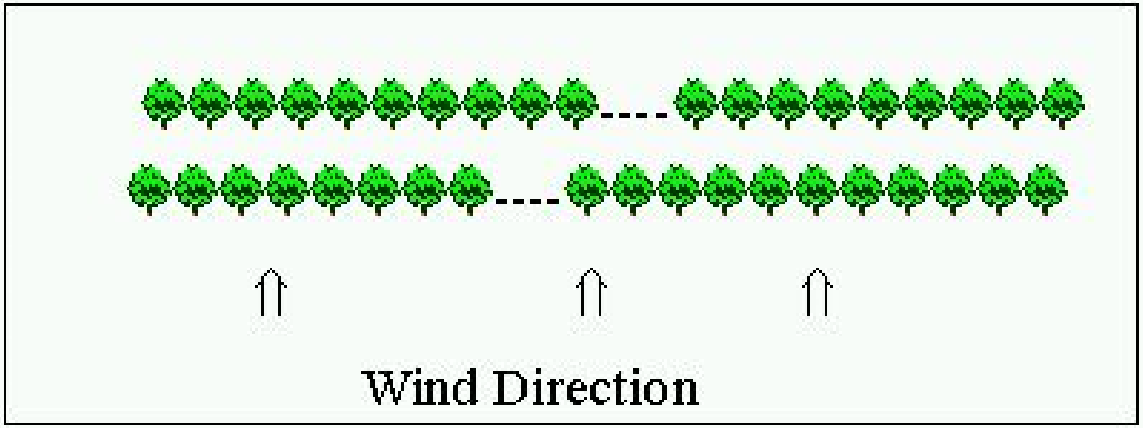
Space between the reed-screen is 8-10 times of height of these screens.

SHELTER BELT WORKS





SOWING SOME SPECİES AS SCREEN

SECOND PHASE OF PREVENTIONWORKS ON 4300 ha ON SAND DUNES

- GRASSING After reducing the wind speed, grassing practices was applied to cover the soil surface.
- In grassing,Rye (Scale sp.), Agropyron Cristatum, Agropyron Elongatun as well as different weeds were used.

SECOND PHASE OF PREVENTION WORKS ON 4300 ha ON SAND DUNES

REDUCE WIND SPEED

THIRD PHASE OF PREVENTION WORKS ON 4300 ha ON SAND DUNES

- AFFORESTATION
  - After grassing spaces between these screens, tree plantation among the reed-screens were started in order to ensure the permanent cover
  - Trees (selected locally adopted large and needle-leaved) were supplied from nursery established in the project area and also from the other agencies

- AFFORESTATION
- Some selected trees in afforestation
  - Russian olive (Eleagnus sp.L)
  - Locust (Robinia pseudeaccacia)
  - Ash tree (Fraxinus sp.L)
  - Elm (Ulmus sp.L)
  - Maple (Acer sp.L)
  - Gladicia

4000 ha. AREA of DUNE SHADOWS

- This area ,about 4000 ha, covers small dunes
- Within the project area, there were some 140 species of flora.
- Researches reveal that excellent grasslands and meadows once flourished here, but they were reduced to almost nothing due to :
  - Overgrazing,
  - Using some grass species as fuel and
  - inappropriate land use, improper farming system, using unsuitable machinery and equipment and cultivation of pasture for the purpose of farming

4000 ha. AREA of DUNE SHADOWS

- Four species of local plants only survived because of these reasons mentioned above
- These four drought-resistant are ;
  - Tapir (Marrubium parviflarum),
  - Geven (Astragalus micracophalus),
  - Yandak (Alhagi camalorum),
  - Püren (Artemisia sp.)

4000 ha. AREA of DUNE SHADOWS

- Because of these reasons mentioned above meadow was destructed and as a results ;
  - Small dunes which were formed by the accumulation of wind drifted materials around these four plants reach at 0.3 m at height and 0.25-2.00 m at width.

Tapir
Marrubium parviflarum

Geven
Astragalus micracophalus

Yandak
Alhagi camalorum

Püren
(Artemisia sp.)

PREVENTION WORKS ON 4000 ha AREA of DUNE SHADOWS

- When hedging the area with wire fence was completed, practices were started to control the moving sand dunes
- Rangeland improvement was implemented in two ways :
  - 1. Bare areas among the small dunes were planted to cultivated crops for meadow amelioration without damaging the natural vegetation
  - 2. Mixed grass seeds were sawn by drills on the areas where natural vegetation has been removed.

PREVENTION WORKS ON 4000 ha AREA of DUNE SHADOWS

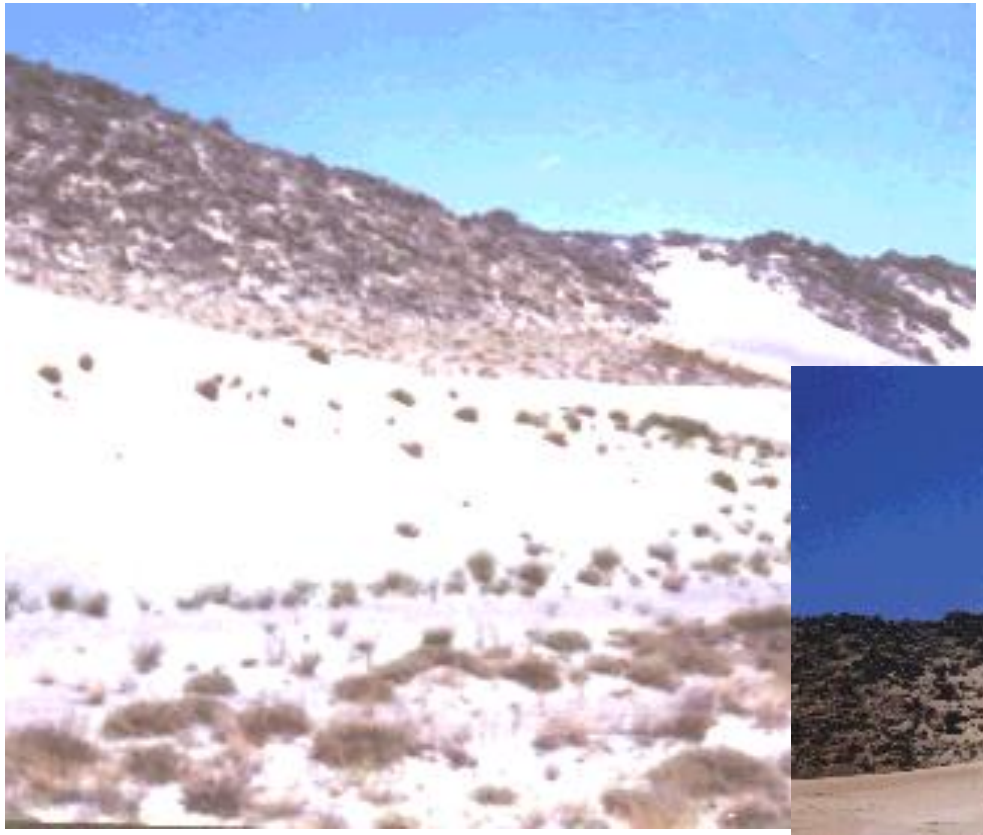
- And also another control measures were taken such as ;
- Interventions of human and livestock were prohibited,
- Seeds of current four species of plant were sampled , produced and sown on the pasture

PREVENTION WORKS ON 4000 ha AREA of DUNE SHADOWS

1500 ha. AREA of BAZALTIC ROCKS

- This area, 1500 ha of bazaltic rocks, starts very near to sub-province and extends into the sand dunes.
- About two decades before our works were commenced in Karapınar, this area was covered width woods enough to meet the firewood requirements of the sub-province. But not even a single tree at the time we started surveys

PREVENTION WORKS ON 1500 ha AREA of BAZALTIC ROCKS



3200 ha AREA OF DRY FARMING AREA

- 3200 ha of Dry Farming Area
  - 2000 ha of Strip-Cropping
  - 1000 ha of Farmer Area
  - 200 ha of Irrigation Area (Vineyard and Seedling Production Area)

2000 ha of DRY FARMING AREA

- There wasn’t any vegetative cover before commencing the control works.
- In this area, 3200 ha, dry farming practices was applied by the villager abandoned village due to erosion.
- Strip-cropping practices under dry conditions started on the area of 2000 ha, 1000 ha cultivated and 1000 ha falowed.
- Strip-cropping , counter to dominant wind direction was applied
- Strip Width is 40-60 m

2000 ha of DRY FARMING AREA

1000 ha of DRY FARMING AREA

- When the erosion controlled on 3200 ha villager (abandoned formerly) came back to their land
- They are continuing their farming practices on the area of 1000 ha under our controlling

200 ha of IRRIGATION AREA

- In areas where field crops farming under dry conditions was not possible , vineyard and orchards were established.
- 35 deep wells were drilled for the purpose of irrigation. In this area ;
  - Researches were carried out and have been still carrying out .
  - Various irrigated farming crops are grown
  - Seedlings e.g. Peach, pear, apple, apricot, cherry, morello cherry and plum, were planted .

TECHNICAL EXCURSION ON SAMPLE HILL

- Every year technical excursions from the University, Technical Schools, State Agencies, delegation both native and foreign have been organised.

- In view of the investment and costs, the benefits obtained by project implementation can be summarised as follows:
  - Prevention of Moving Karapınar Town to some other location
  - Increased Value of Land
  - Highway Traffic
  - Human and Livestock Health
  - Effect of Agricultural Structure

–Wind erosion prevention works carried out in Karapınar, Konya, have caused great interest both in the country and abroad.

–Native and foreign visitors to Karapınar, especially those who are professionally interested in the works,have highly appreciated the results achieved in the area.

- In fact, wind erosion control works are being implemented in many other count es,e.g.our neighbouring countries in the south.
- But, what is really remarkable in our success is to make use of the most economic methods and shortest time to transform a desert land into a fertile arable land.

- One of the most important factors was water supply in this project. Since the area was deficient of adequate surface water resources, irrigation water was supplied from ground water resources.

- We have extended the limits of our responsibilities to involve the farmer living in the vicinity to the project area;

- they have learned to apply modern farming technigues, e.g. use of underground water for irrigation, adoption of new kinds of crop, fertilisation, crop sequence, etc.

- Profit obtained has recovered the expenses in a short time and gave way to increase in income.

- The project area, presently, is a national park; it is a recreation area for the amusement, holiday and hunting pleasure of the people from nearby provinces.
- Now, the sky of Karapınar is cleared form black clouds of sand.

- A fearful nightmare has turned into a bright dream of green fields, orchards and gardens, with the light of happiness on faces of those people who have succeeded the miracle.
- This is the legend of a (Black Spring" becoming "Green Spring with life outpouring from its soils.

STRIP FARMING

Strip farming is applied to low slope areas. Strips are designed in uniform width and towards common wind direction.

PASTURES IN KONYA

- ✓ 273 species identified.

(www.ulusalmera-tagem.gov.tr)

- ✓ Pastures in Karapınar Desertification and Erosion Reserch Center, 16 species were identified surveyed six different location.
- ✓ Centaurea virgata % 52,5 frekans
- ✓ Festuca ovina, Festuca arundinacea %30 frekans
- ✓ Phleum pratense % 20 frekans
- ✓ Scabiosa argentea % 25 frekans
- ✓ Alhagi pseudalhagi % 20 frekans
- ✓ Acroptilon repens % 19 frekans
- ✓ Scleranthus annuus % 10 frekans

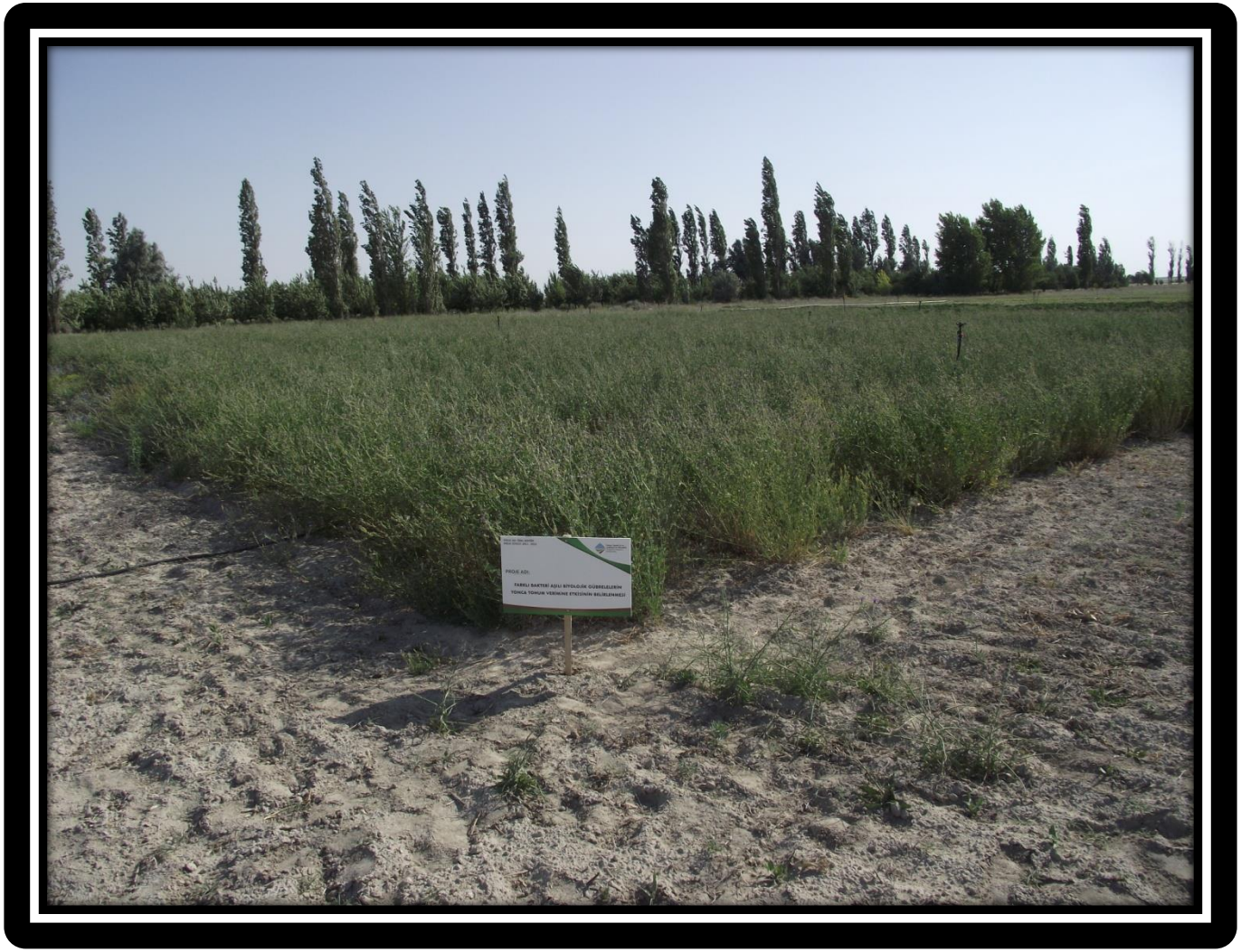

03/12/2007

18 NİSAN 2012 ANKARA-KONYA HIGHWAY


3 ÖLÜ, 87 YARALI

Our guests abroad

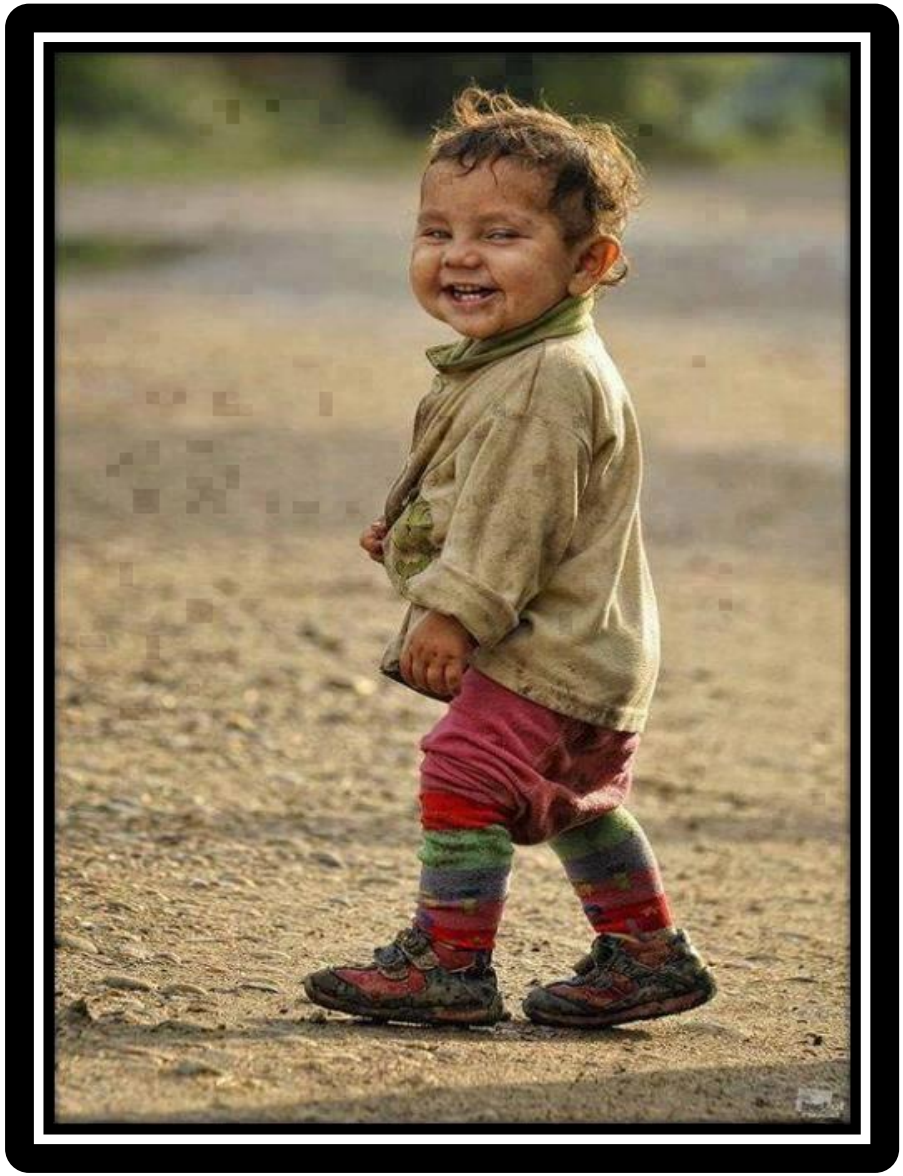

17/06/2007


PROJE ADI:
FARKLI BAKTERİ AŞILI BİYOLOJİK GÜBRELERİN
YONCA TOHUM VERİMİNE ETKİSİNİN BELİRLENMESİ

- ✓Measures implemented in the project area turned the desert into an oasis, and have been received admiration from many countries and have been taken as a model.
- ✓ Project area is still functioning as a training and educational area.

- Project area is now a recreational land and a national park.

- This natural disaster became a green land, people who turned this miracle into a reality are now happy by succeeding this mission.
- This project turned a desert into a fertile and green lands and it is known as legend of Karapinar.



THANK YOU…