

CLIMATE FACTORS AND THEIR RELATIONS REGARDING CONE YIELD OF STONE PINE TREES (*Pinus pinea* L.) IN KOZAK BASIN

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Aegean Forestry Research Institute-Izmir-TURKEY-2011

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Forest land distribution at Turkey



Natural Distribution of Stone Pine



There is a 43.000 Ha of stone pine forest in Turkey.

Kozak Basin Properties

Kozak Basin has largest stone pine forest which is about 16.000 ha.

At western side of basin there is low cone yield.

A relation between this low cone yield and climate factors has been Investigated. Also climate factors and pollination has been studied.



MATERIAL

1:25000 scale topographic maps

Long-term rainfall data

3 units meteorology station

METHOD

The areas in the basin with different cone yield have been signed on map according to the information got from local people . Three meteorological stations have been put for representing these areas. These are,

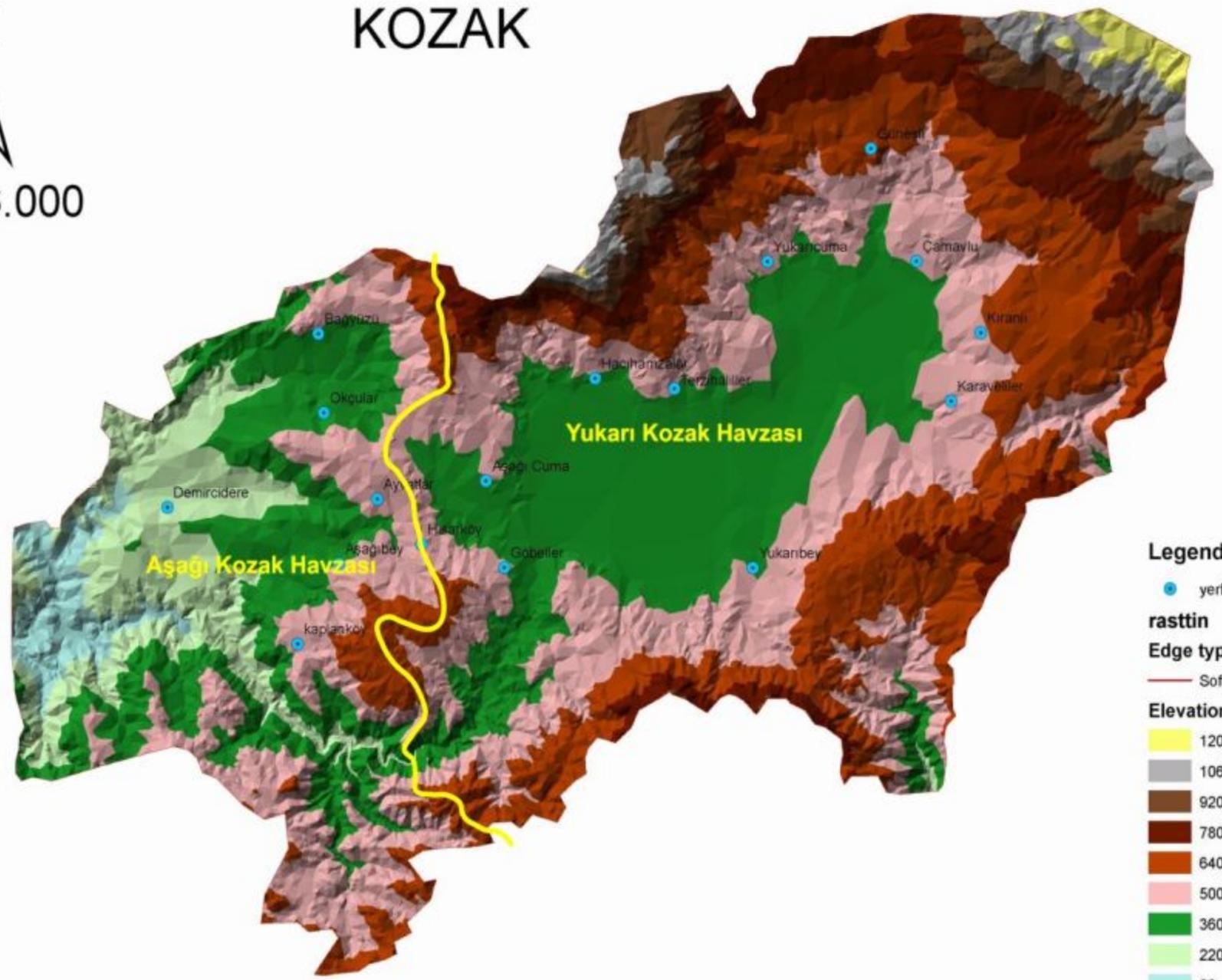
- 1-Karaveliler Village 587 m (high cone yield),
- 2- Pompa 430 m (low cone yield)
- 3- Demircidere Village 230 m (low cone yield)

At every hour temperature, humidity and wind speed have been measured.

KOZAK



1:126.000



Legend

• yerlesim

rasttin

Edge type

— Soft Edge

Elevation

- 1200 - 1340
- 1060 - 1200
- 920 - 1060
- 780 - 920
- 640 - 780
- 500 - 640
- 360 - 500
- 220 - 360
- 80 - 220

FINDINGS

The areas with low cone yield are below 500 m
high yield areas are above 500 m.

DSI (STATE HYDRAULIC WORKS) PRECIPITATION DATA

- Average annual precipitation is 938 mm according to data of Yukaribey Village DSI Station,
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- 740 mm according to data of Güneşli Station
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- And 743 mm according to data of Bağyüzü Village Station

Pollination Period

- It is determined that:
- In plain area where cone yield is low and altitude is about 430- 500 m pollination period is between 28th May and 3rd **jun**,
- In the areas with high yield where altitude is higher than 500m is between 19-29 May,
- In the area which has low yield and altitude is about 230 m the period is between 12-20 May

Pollination Period

- There are a few days differences in pollination period depending on climate conditions.
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- In the plain where altitude is below 500m the pollination period starts much more afterwards than places with higher altitude.

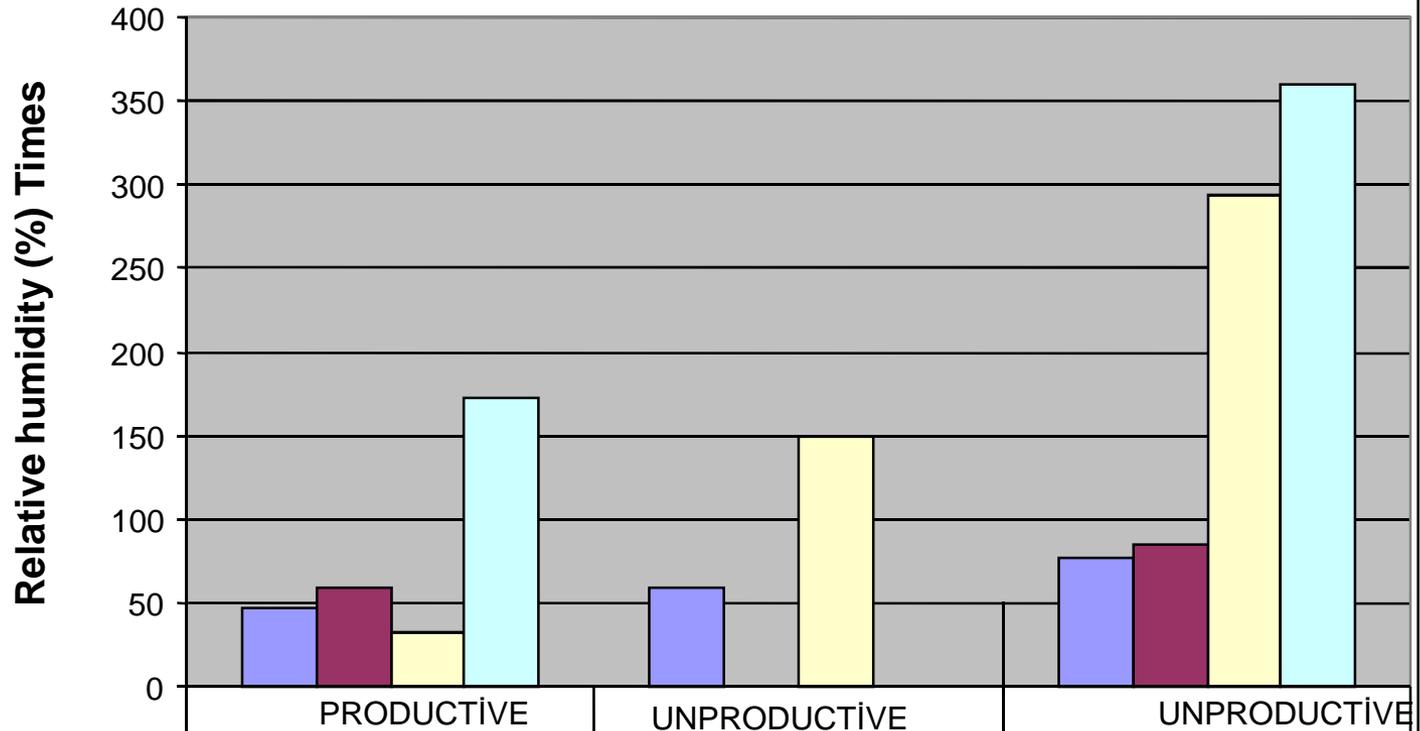
Climate Data for Pollination Period

LOCATION	Pollination period	Year	Climatik data				
			Temperature(°C)			Humudity	Wind speed
			Average	Max	Min	Average (%)	Average (m/s)
Karaveliler Village (587 m) (PRODUCTIVE)	19-31 May	2009	19,97	32,13	9,93	47,4	1,45
		2010	18,52	32,44	7,39	59,64	0,94
DemirciDere Village (230 m) (UNPRODUCTIVE)	12-20 May	2009	20,56	31,4	8,3	59,16	0,39
		2010	-	-	-	-	-
Pompa (430m) (UNPRODUCTIVE)	28 May- 3 Jun	2009	17,51	29,8	1,7	77,04	0,75
		2010	16,27	30,8	-0,1	84,76	0,67

Number of days during pollination period with a temperature below 10 °C

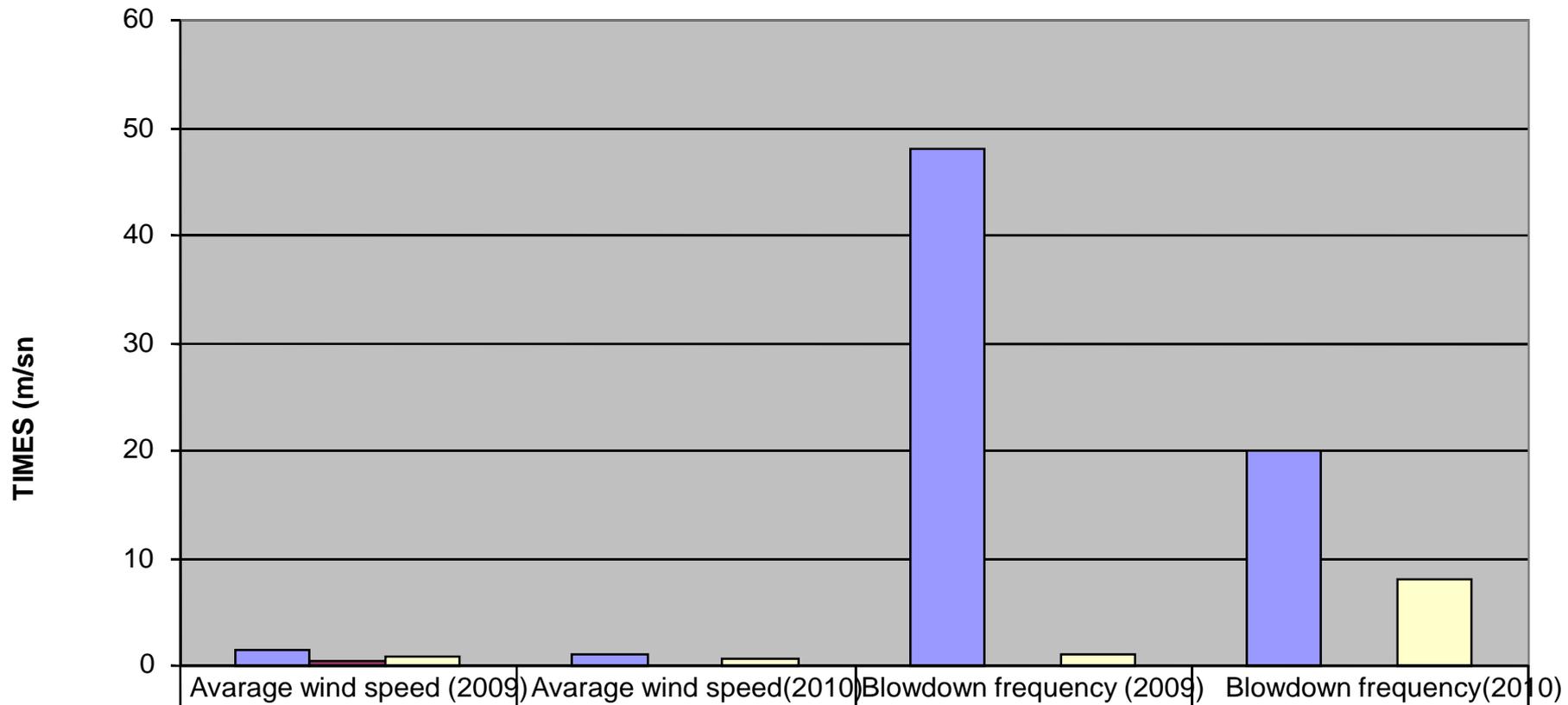


Relative humidity Data for Pollination Period



	PRODUCTIVE	UNPRODUCTIVE	UNPRODUCTIVE
■ Average Relative humidity-2009)	47,41	59,16	77,04
■ Average Relative humidity-2009(2010)	59,64		84,76
■ >%70 Relative humidity (times)	32		294
■ >%70 Relative humidity (Times)	172	150	360

Wind Speed Data for Pollination Period (Wind speed over 3m/s)



■ PRODUCTIVE	1,45	0,94	48	20
■ UN PRODUCTIVE	0,39	-	0	-
■ UN PRODUCTIVE	0,75	0,67	1	8

RESULTS

- Regarding topographical features the basin consists of two parts. One is Lower Kozak Basin the other is Upper Kozak Basin. Stone pine populations are situated in Upper Kozak Basin between 430-1010m and in Lower Kozak Basin between 80-575m..
- Although both basin have same bedrock and similar soil properties, cone yields are different. Vegetative development and nutritional conditions of the trees in Upper Basin are determined as better than that of Lower Basin.
- Stone pines situated over 500m have better cone yields.

- There is a difference of 22°C between day time and night in the low yield plain which is located in Upper Kozak Basin (altitude is 430m).
- This area has more frequent days with a temperature below 10 °C, early and late frosts, relative humidity is high and fog occurs frequently.
- The plain shows a typical “frost pit”. The trees of the plain have a cone yield lower than other places.

A Foggy Day View of Kozak Basin





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- Wind speed over 3m/s is effective for pollen transportation during pollination period.
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- Regarding that, areas over 500m and with high cone yield has enough wind, and wind speed is not enough in areas with low yield.
- Precipitation, high relative humidity extreme temperatures during pollination period have also negative impact on pollination.

- In the areas where cone yield is low there also enough conelet formation initially. But these conelets fall down mostly in June, July and August.
- It is determined that these losses go on even in October in year 2010.
- In 2010 prevailing climatic condition during pollination period was different than that of previous year and It is thought that this triggered fungal diseases.



