EFFECT OF WHEAT BUG (EURYGASTER INTEGRICEPS) DAMAGED ON QUALITY OF WHEAT IN TURKEY

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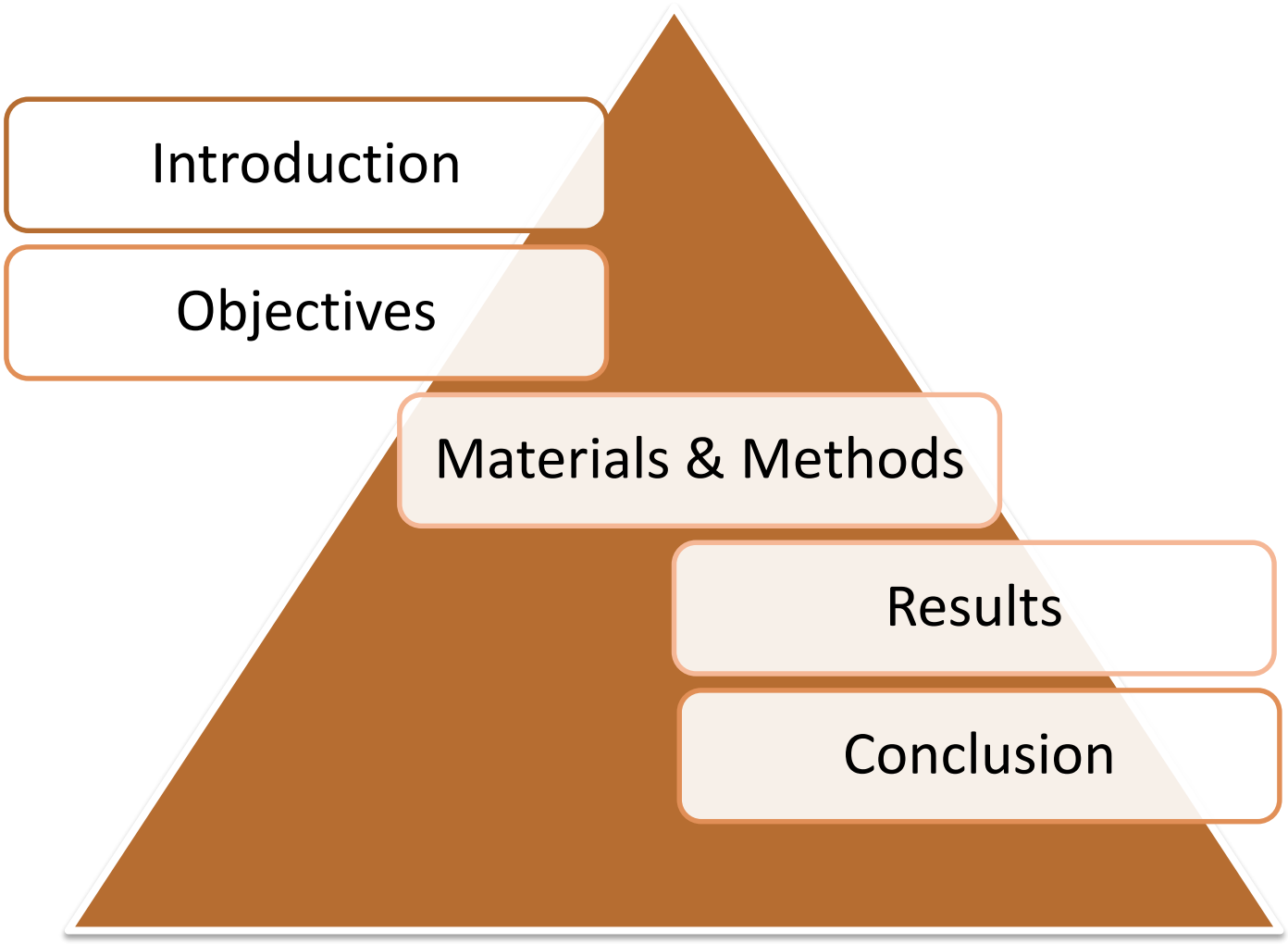
Outline


Introduction
Objectives
Materials & Methods
Results
Conclusion

Introduction

Certain species of sap-sucking bugs (Insect) feeding on wheat or any cereal may damage the grain.

The insect called different name;

Wheat bug,
Cereal bug,
Sunn bug,
Sunn pest
Chinch bug,
Stink bug,

Introduction

The other types of insects,
Nysius huttoni in New Zealand,
Chlorochroa sayi (Sthal) and ***Orange Wheat blossom Midge*** (*Stodiplosis mosellana Gehin*) in North America have been reported to cause reduced baking quality of Wheat.

The bug damage of by insects usually by the *Eurygaster spp and Aelia spp* is prevalent in Middle East, Eastern Europe and some Mediterranean regions (Gültekin 1990).

When demaged grain milled to the flour is not good for procssesing and baking quality.

Introduction

Wheat bug saliva contains a very powerful proteolytic enzyme which causes rapid relaxation of the dough during the baking process and breakdown of the gluten structure.

Dough made from damaged flour is runny and sticky and loaves of bread have a low volume and coarse texture .(Berliner 1931;Kretovich 1944; Hanford 1967; Meredith 1970; Kruger 1980).

Introduction

The small black dot on the wheat is the penetration point.

Early stage → easy to remove inside the garin.

Mature grain → small deformation of the sucking point

Introduction

Wheat bug (Eurygaster spp and Aelia spp) damage was appears intensively in certain parts of Turkey. It has reduced both wheat yield and quality in Turkey and neighbours for years.

<u>During 1927-1941</u> big demage was occured in sourthen and east of Anatolia (Paulian and Popov 1980).

<u>During the 1980s</u> population increasing in Trakia region

and very serious damage was reported in the region in 1987.

Introduction

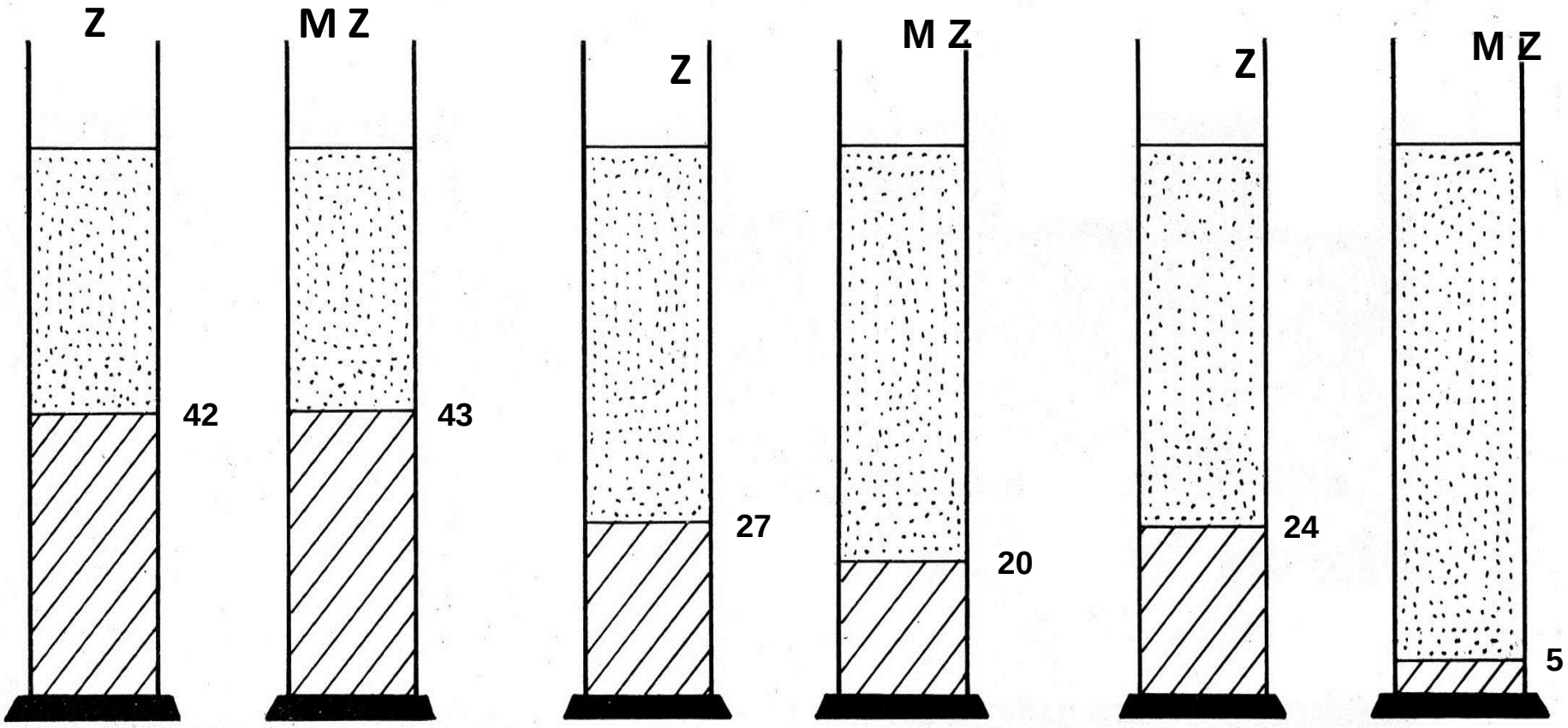
After 1990 wheat bug damage began to spread to the central Anatolia region.

In 1993 ; 1.300 000 hectares area was invaded with wheat bugs and agricultural pesticides were applied on a half part of this area (FAO report).

nearly 20% wheat cultivated area.

Introduction

Zeleny sedimentatian and Modified Zeleny Sedimentation



Sound wheat **5% effected wheat** **15% effected wheat**

Z: Zeleny sedimentatian

MZ:Modified Zeleny Sedimentation

Introduction

Demaged grain has proteinase enzyme and the enzyme is not active because in the media does not has water also temperature is low.

During fermentation water and temperature are sufficient to activate the enzyme.

Activity of the enzaym;

- Hydrolyze Glutenin proteins,
- Decrease HMG and LMG glutenins
- The dough get softenss,
- Elastic properties on dough disappears and can not be prosesed.
- Produce low CO_2

  Low bread volume

Introduction

When field has intensive sunny bug;

decrease grain yield

- undesirable smell on spike
- flour may be get bitter
- physical properties of the grain are getting worse.

Sunn bug damage affects protein quality rather than protein content

- Alveograph energy value (W),
- farinograph softening degree, development time arrival time and stability
- Farinograph water absorbtion capacity

are affected

Material Method

MATERİAL

Bread and durum wheat varieties had been exposed to sunn bug damage under the cage.

For this purpose , 50 males and 50 females insect were placed in cage. The same varieties were produced on the open field in the nearby location (chek samples) to get samples without sunn pest demage (sound samples).

Demaged samples were countet and the demege ratio were determined.

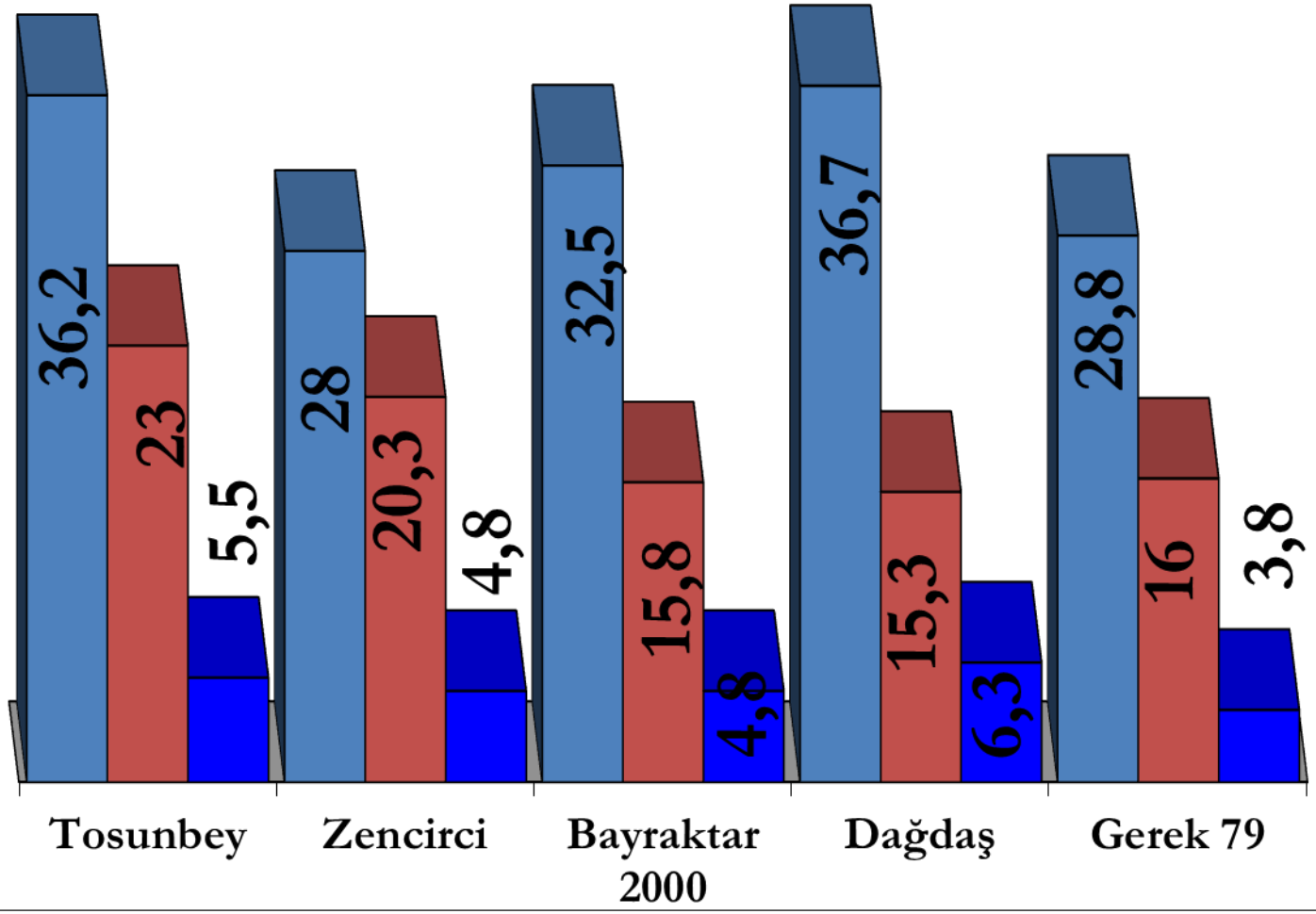
Quality analyesed were done on this samples

Matrial and Method

MATERİAL METHOD

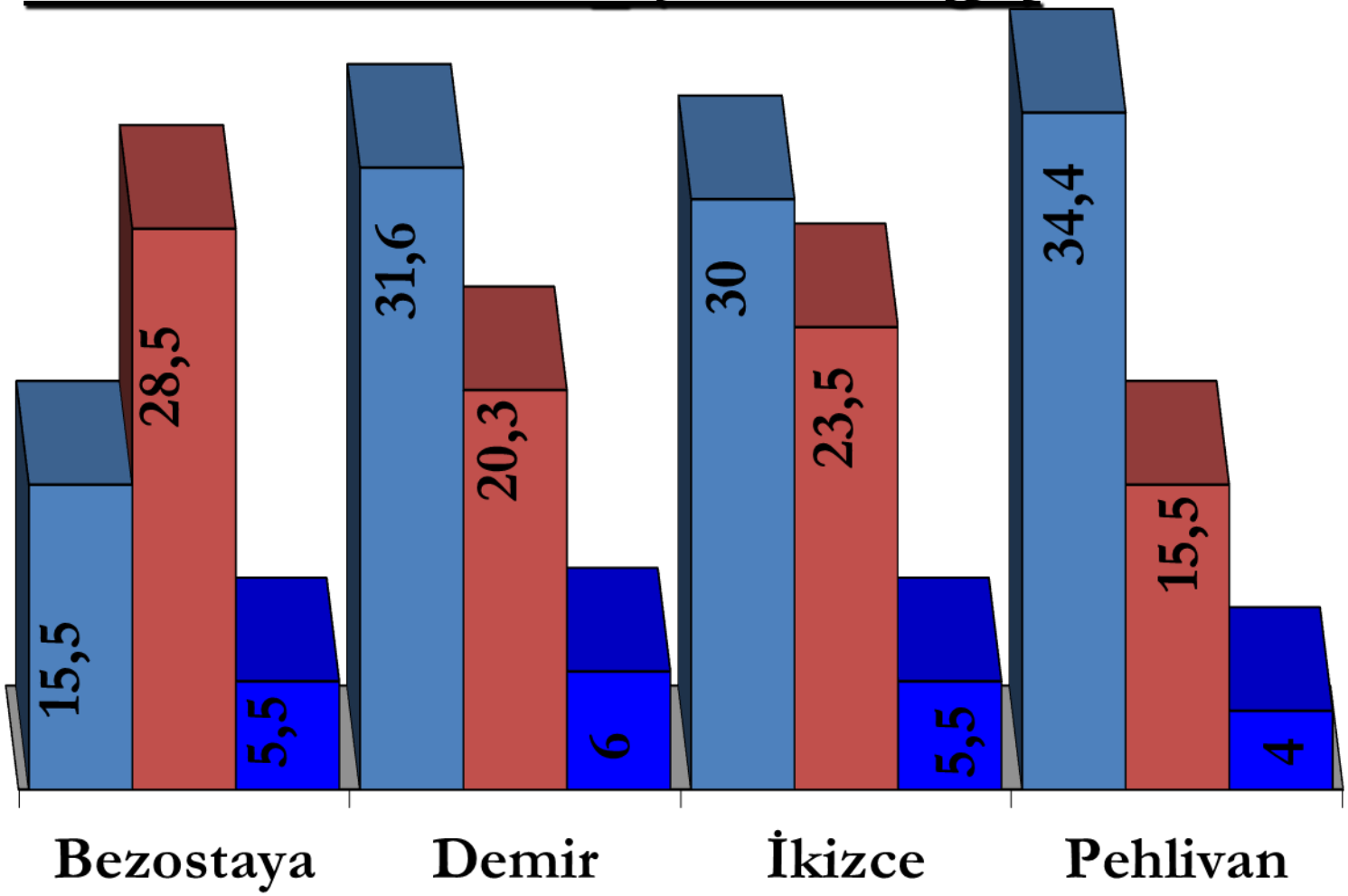
Test weight	Vasiljevic and Banasik, 1980
Thousand Kernel Weight	Özkaya ve Özkaya, 2005
Protein Content ,	AACC Metod No:46–30 (AACC, 2000)
Zeleny Sedimentation	ICC Standart No: 116-1
Modified Zeleny Sedimenttion	Köksel vd., 2000
Wet gluten content,	AACC Metod No:38-12A (AACC,2000)
Farinograph,	AACC Metod No:54–21 (AACC, 2000)
Alveograph,	AACC Metod No:54-30A
Spread of Gluten	ISO 520:2010

White Bread Wheat (under cage)



Result

Red Bread Wheat (under cage)



Alveograph W And P/L

	Demage %	Alveograph W	P/L
Bezostaja	0	308	1,1
	13,5	155	1,3
Tosunbey	0	304	2,5
	31,5	192	1,0
	38	151	1,5
	43,3	102	0,7
İkizce 96	7,2	185	3,1
	34,2	130	2,6
	30,5	100	2,4
	27,4	75	2,0
Zencirci 2000	9	107	0,8
	18,1	96	0,8
	20,7	85	0,8
	27,1	80	4,4
	45,9	50	2,7

Result

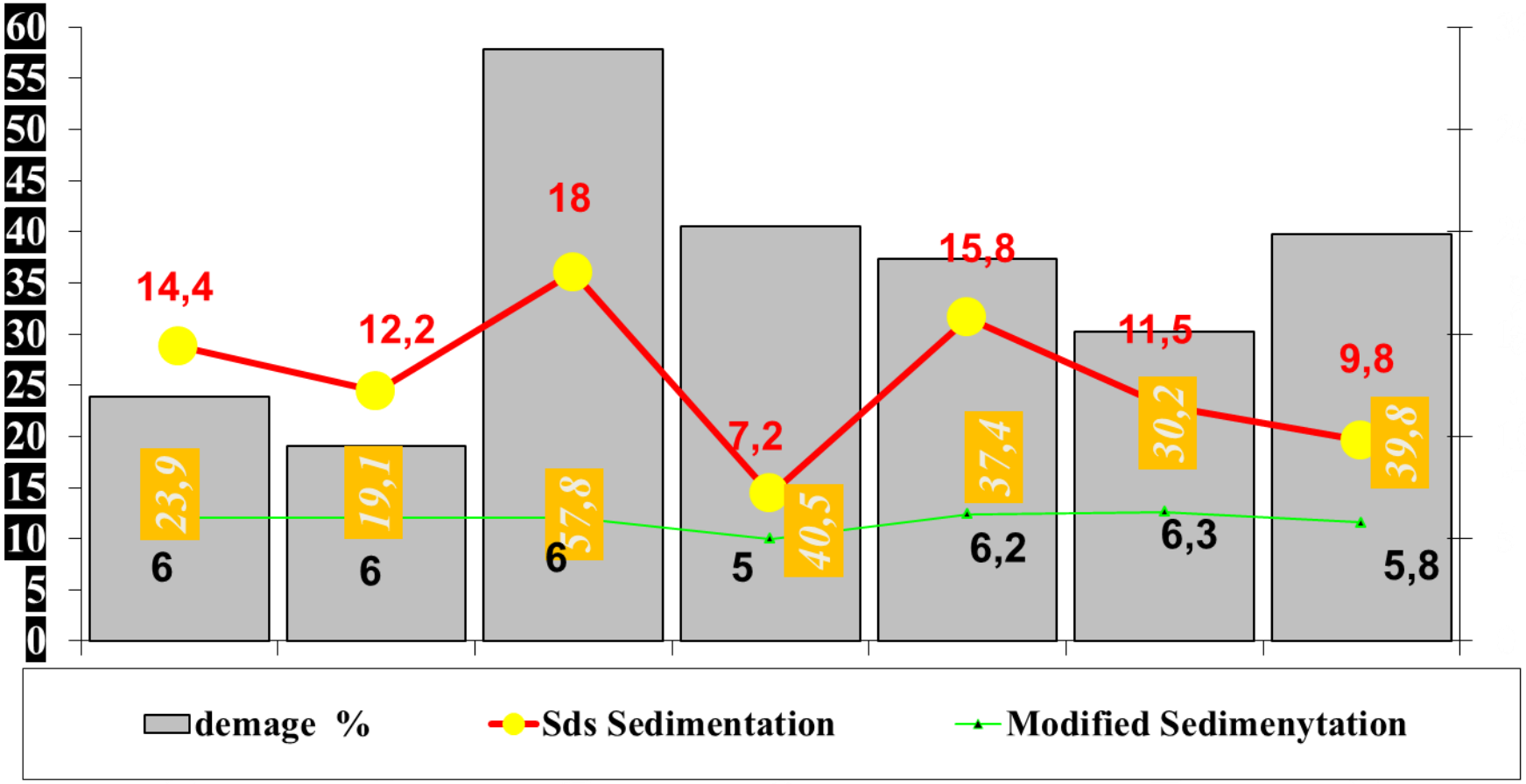
Cultivar	Test weight (kh/Hlt)	TKW (g)	Protein Content (%)	Zeleny sedimentation (ml)	Modified Zeleny Sedimentation (ml)	Wheat bug pieces/parcel	Demaged kernal (%)
Bayraktar 2000	81.10A	28.9AB	12.4AB	22.5B	18.7AB	37 A	7.05BC
Demir 2000	79.15BC	29.6AB	12.8A	32.5A	25.0A	17 B	5.08BC
Tosunbey	80.68AB	26.7B	12.0B	36.0A	22.25AB	12 B	3.80C
Ç-1252 (Durum	80.97A	31.5A	12.2AB	19.5B	9.5B	26 AB	8.00B
Kunduru 1241 (Durum)	78.18C	31.6A	12.8A	18.0B	8.5B	26 AB	11.52A
LSD	1.618	3.71	0.7871	5.291	11.21	16	3.435
CV	0.94	8.13	4.11	9.53	30.91	45.16	22.43

Result

Cultivar	Demaged level	Test weight (kg/hlt)	TKW (g)	Vitrousness
Ege 88	Undemaged	80.8a	36.7a	92a
	Medium	76.6b	31.9b	72b
	High	71.9c	29.4b	56c
Diyarbakır 81	Undemaged	78.9a	35.2a	96a
	Medium	77.1b	32.1b	64b
	High	71.5c	27.7c	42c
Fırat 93	Undemaged	80.4a	32.4a	90a
	Medium	76.9b	30.2b	66b
	High	74.6c	29.2b	36c
Svevo	Undemaged	80.1a	34.2a	94a
	Medium	76.7b	32.1b	78b
	High	72.5c	31.4b	58c
Zenith	Undemaged	81.0a	36.8a	90a
	Medium	77.3b	33.0b	76b
	High	72.6c	29.6c	38c

Result

Durum Wheat



Result

Samples	Wheat bug demaged	Test weight (kg/hl)	TKW (g)	Vitreousness (%)	Unsu Tane Oranı (%)	Dönmeli Tane Oranı (%)
Ege-88	undemaged	80.8a	36.7a	92a	6c	2b
	Moderate	76.6b	31.9b	72b	22b	6ab
	High	71.9c	29.4b	56c	34a	10a
Diyarbakır-81	check	78.9a	35.2a	96a	2b	2c
	Moderate	77.1b	32.1b	64b	28a	8b
	High	71.5c	27.7c	42c	22a	36a
Fırat-93	check	80.4a	32.4a	90a	8c	2b
	Moderate	76.9b	30.2b	66b	20b	14a
	High	74.6c	29.2b	36c	54a	10a
Svevo	check	80.1a	34.2a	94a	3c	3b
	Moderate	76.7b	32.1b	78b	20a	2b
	High	72.5c	31.4b	58c	10b	32a
Zenith	check	81.0a	36.8a	90a	6c	4b
	Moderate	77.3b	33.0b	76b	22b	2c
	High	72.6c	29.6c	38c	54a	8a

Corelation

	Z.Sedm.	Mod. Z. Seidm.	Dry glt	Gluten	Glt Inx	Strech (BU)	Relaxation (BU)
Demaged Ratio		**-0,559****	-0,262		**-0,55****	0,292*	**0,371****
Test Weight	0,271*	0,456**	0,305*		0,318*		
TKW	0,331**	0,314*	0,354**	0,294*			
Flour Yield			0,377**	0,32*			
Grain Protein	0,422**		0,439**	0,491**	-0,270*		
Zeleny Sedim.		0,494**	0,258*	0,314*			
Modified Zeln. Sedim.					0,349**	-0,325*	-0,378**
Dry Glt				0,888**		-0,307*	-0,339**
Glt.İnd.						-0,368**	-0,372**

Corelation Between quality Parameters and Demage Ratio

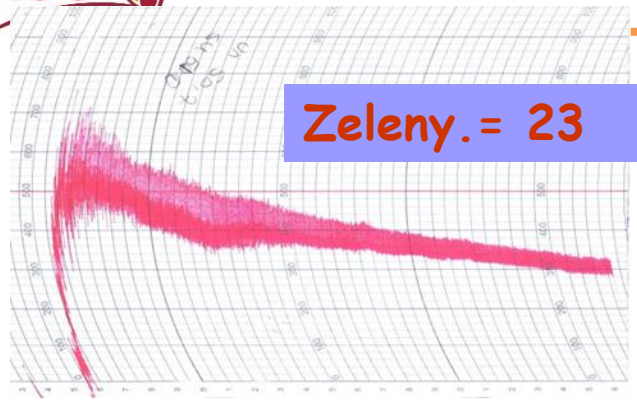
Parameters	TKW	Proten	Zeleny sed.	Mod. Zel. Sed.	Insect	Demae (%)
Test weight	- 0.232	- 0.600**	0.113	0.024	0.097	- 0.450 *
TKW		0.321	- 0.484*	- 0.361	0.367	0.501 *
Protein			- 0.091	-0.062	0.168	0.382
Zeleny				0.699 **	- 0.455 *	-0.729 **
Modified Zeleny					- 0.293	-0.735 **

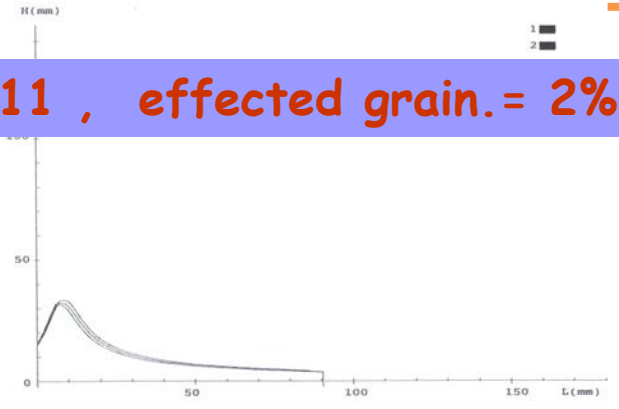
* 0.05 significanet
** 0.01 Significant

Result

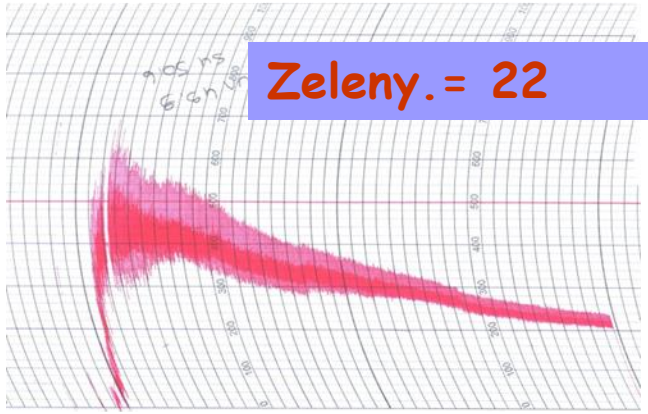
samples	flour protein (%)	Zeleny Sedimentation (ml)	wet Gluten
Check	13,8	31,6	38,1
1% Demage	13,6	28,9	36,5
3% Demage	13,3	28	36,2
5% demage	3,3	27,5	33,7
7% Demage	13.2	27,5	33,3
9% Demage	13	27,2	30,6
15% Demage	12,8	25,1	not dedected
LSD (0,05)		0,821	0,771

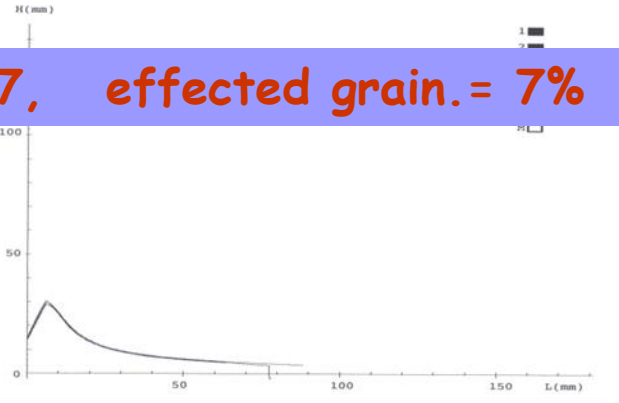
Result



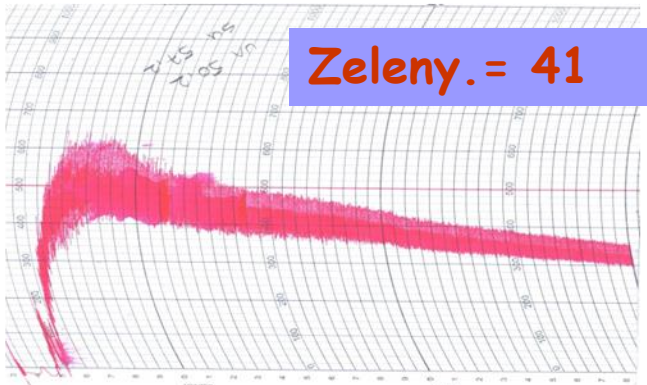


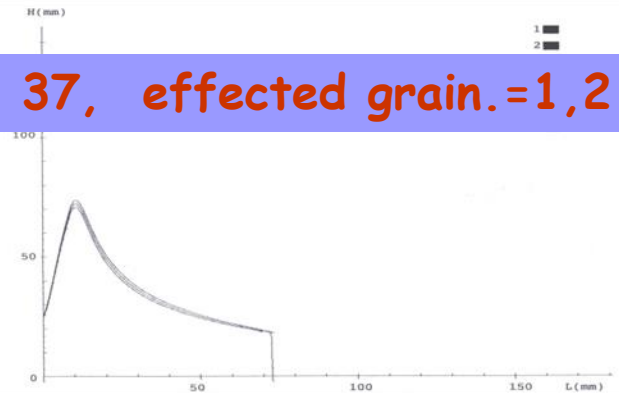
Zeleny.= 23 Mod. Zeleny.= 11 , effected grain.= 2%





Zeleny.= 22 Mod. Zeleny.= 17, effected grain.= 7%



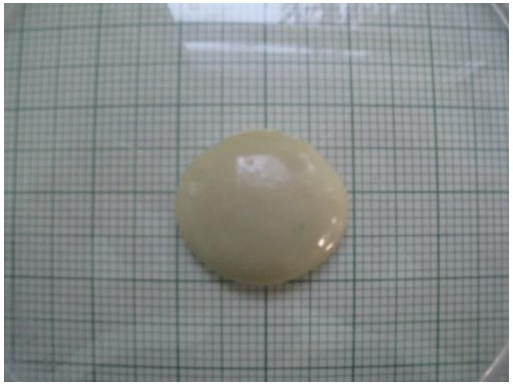


Zeleny.= 41 Mod. Zeleny.= 37, effected grain.=1,2 %

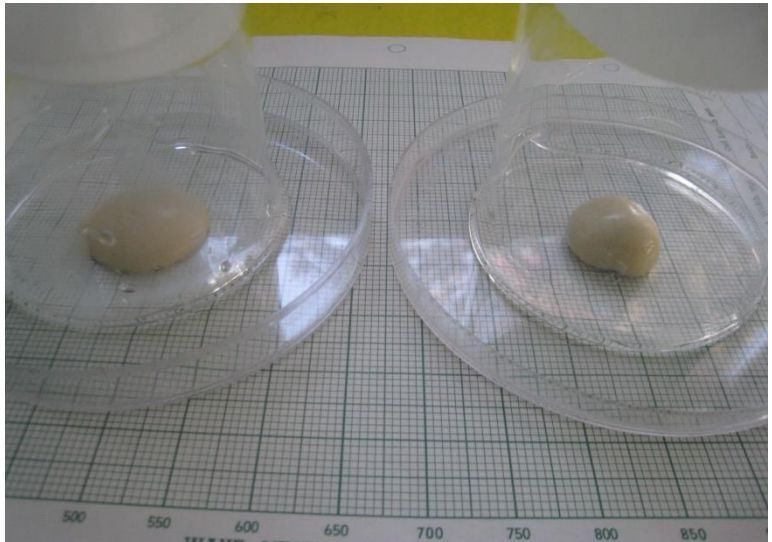
Result

Gluten Spread

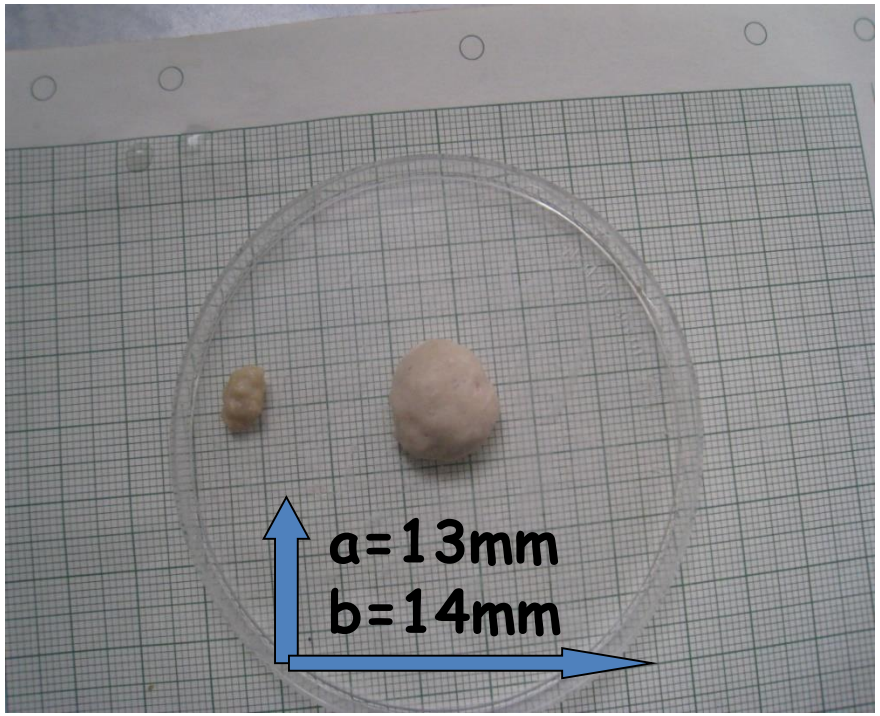
Not demaged karnel



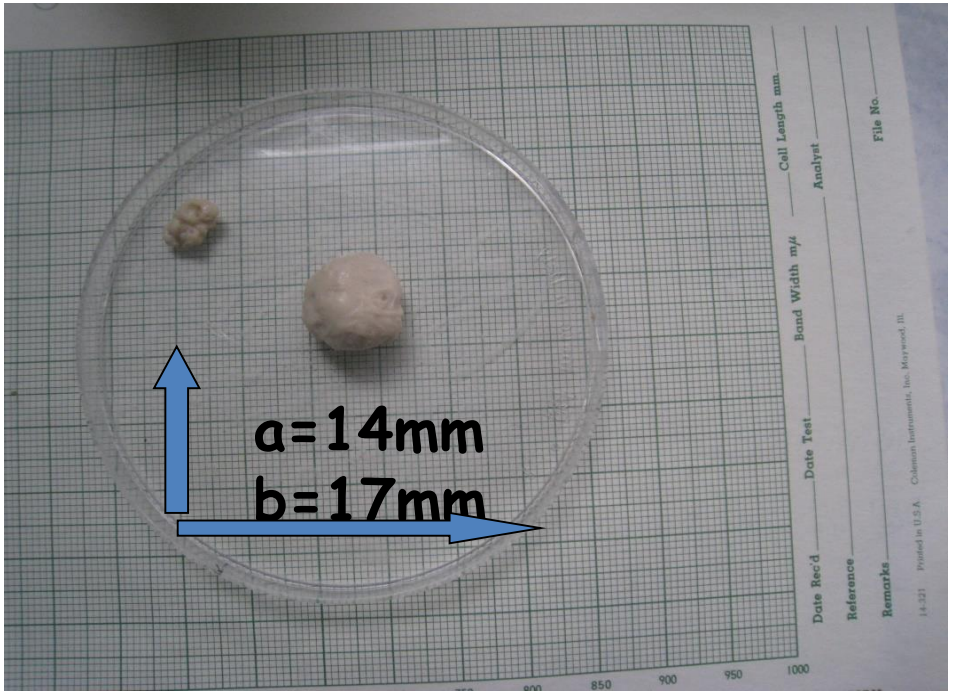
3,2% demaged karnel



Gluten Spread



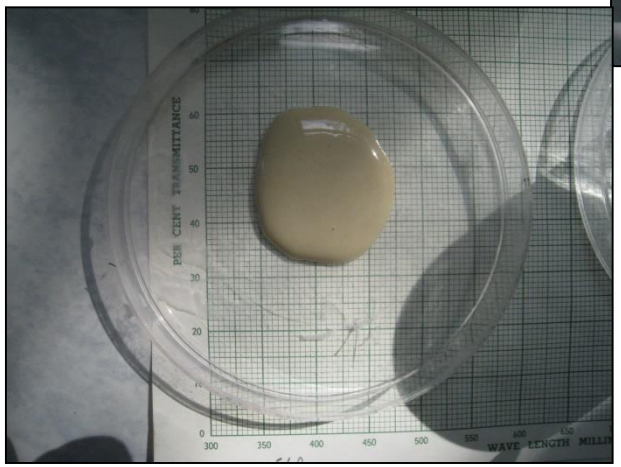
Demaged grain: 0,4%

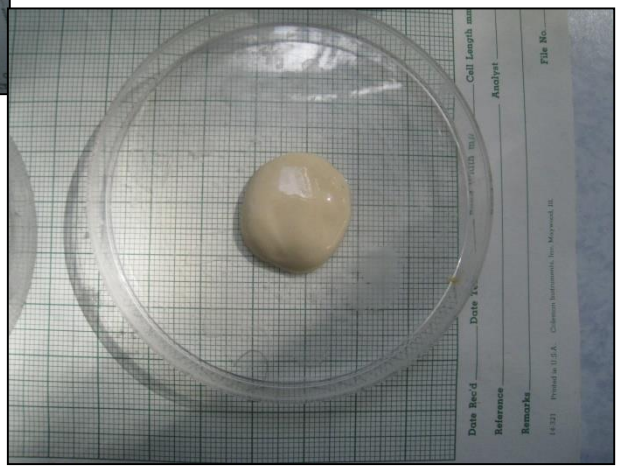


Spread=((a2+b2)/2)-((a1+b1)/2))

Result

Gluten spread





Zencirci
Demaged karnel:18,1%
Zeleny Sedim.:24ml
Modi. Zel. Sed.=5ml
Spread: 7,2

Bayraktar 2000
Demaged karnel:10%
Zeleny Sedim.:19ml
Modi. Zel. Sed.=5 ml
Spread: 5,4

Result

Dry Gluten

Bezostaja
Demaged garin: 13,5%

Zencirci
Demaged grain: 9,0 %

PEHLİVAN
Demaged grain: 1,0%

PEHLİVAN
Demaged grain : 2,6

ADAY-18
Demaged grain : 0,8

ADAY-18
Demaged grain : 0,6

Result

Demir
2000

Bayraktar
2000

Conculcion

- There is different tolerances of demage depending on the varieties qualities
- Develop varieties which has strong gluten structur.
- The harvest must be doing on time
- Varieties which has strong gluten structure should be planted
- Varieties which has early growing habitat escape sunn bug dmage

THANK YOU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