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Isolation and characterisation of  $\gamma$ -gliadins 45 and 42 of durum wheat.

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## INTRODUCTION

A VERY CONSISTENT RELATIONSHIP WAS FOUND BETWEEN THE PRESENCE OF  $\gamma$ -GLIADINS 45 AND 42 IN PAGE AND TECHNOLOGICAL QUALITY OF DURUM WHEAT VARIETIES EXPRESSED THROUGH VISCOELASTIC PROPERTIES OF GLUTEN. ISOLATION AND CHARACTERIZATION OF PURE GLIADINS 45 AND 42 WERE ESSENTIAL :

1 - FOR A BETTER UNDERSTANDING OF THE NATURE OF THE LINKAGE BETWEEN THE GLIADIN ELECTROPHOREGRAMS AND THE VISCOELASTIC PROPERTIES OF GLUTEN (IS THE LINKAGE A GENETICAL MARKER ? IS IT A FUNCTIONAL RELATIONSHIP ?).

2 - IN VIEW TO CHARACTERIZE AND ISOLATE GENES THAT IMPART TECHNOLOGICAL QUALITY OF WHEATS.



## ISOLATION

WHOLE GLIADIN WAS EXTRACTED FROM AGATHE (45 TYPE) AND CALVINOR (42 TYPE) COMPONENTS 45 ( 9,5 % OF WHOLE GLIADIN) AND 42 ( 9,0 % OF WHOLE GLIADIN) WERE PURIFIED BY TWO STEPS OF ION EXCHANGE CHROMATOGRAPHY ON CMC 52 AND ONE STEP OF CHROMATO- FOCUSING.

(SEE COTTENET et al., 1983).



## CHARACTERIZATION

### 1 - AMINO ACIDS COMPOSITION AND HYDROPHOBICITY PARAMETERS (NPS, P $H\bar{\theta}_{ave}$ )

	GLIADINES TOTALES		$\gamma$ -GLIADINES		$\gamma$ -45	$\gamma$ -42
	AGATHE	CALVINOR	AGATHE	CALVINOR		
TOTAL NEUTRAL AA	107	101	95	92	111	112
TOTAL ACIDIC AA	442	466	463	490	494	464
TOTAL BASIC AA	55	54	40	37	52	51
TOTAL HYDROPHOBIC AA	366	347	386	365	343	375
including Pro	132	117	155	137	120	140
Phe	58	61	64	68	75	78
$H\bar{\theta}_{ave}$ (cal/res)	1117	976	1027	972	893	964

### 2 - HYDROPHOBICITY INTERACTIONS CHROMATOGRAPHY (H.I.C.)

(SEE COTTENET et al., 1984)



### 3 - EXTRACTIBILITY FROM SEMOLINA BY INCREASED AMOUNTS OF SOAPS (SODIUM MYRISTATE)

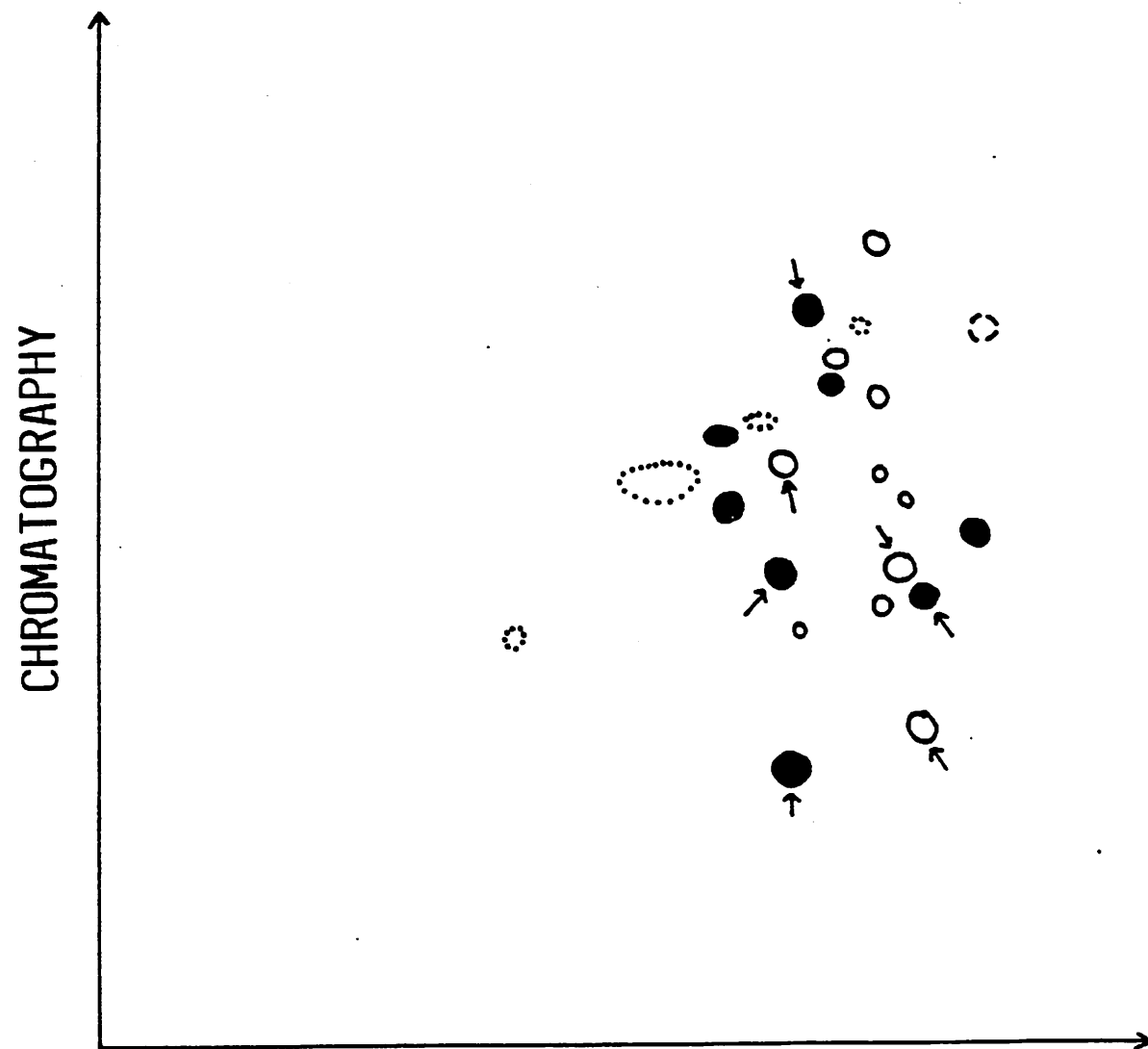
- . QUANTITATIVE AND QUALITATIVE DIFFERENCES WERE OBSERVED BETWEEN AGATHE AND CALVINOR WHEATS.
- .  $\gamma$ -45 SOLUBILIZATION BEGANNED WITH TRACES OF SOAP, SHOWING WEAKER INTERACTIONS WITH OTHER PROTEINS OR OTHER ENDOSPERM CONSTITUENTS THAN IN THE CASE OF  $\gamma$ -42.
- . WITH HIGHER SOAP AMOUNTS ACCESSIBILITY OF  $\gamma$ -42 AMONG SEMOLINA CONSTITUENTS LOOKED BETTER THAN IN THE CASE OF  $\gamma$ -45.

#### 4 - TWO-DIMENSIONAL PEPTIDE MAPPING

PARTIAL STRUCTURAL HOMOLOGY : 50 % OF PEPTIDES ARE COMMON TO 45 AND 42 COMPONENTS.

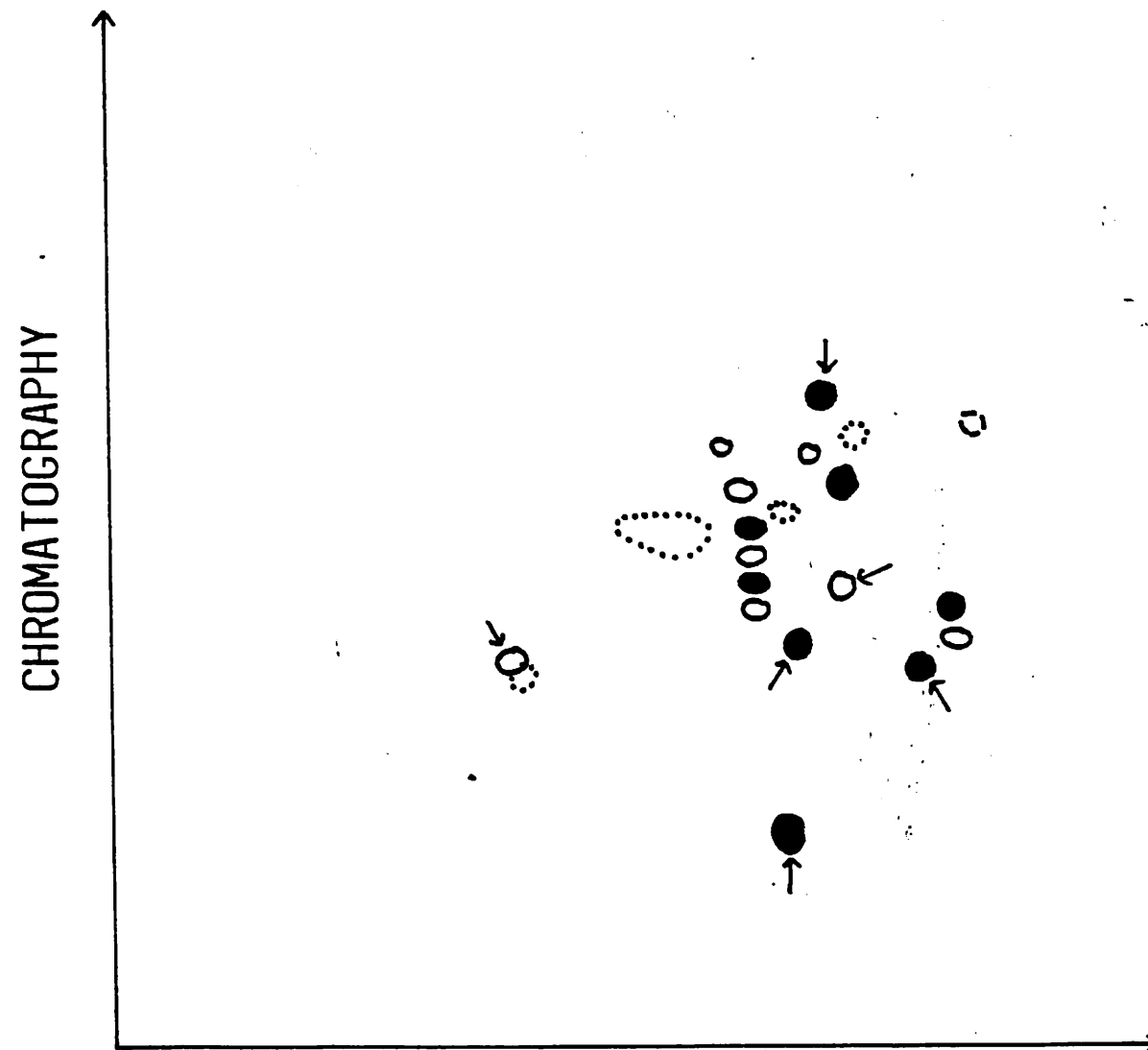
THEREFORE, THERE ARE DIFFERENCES IN PRIMARY, SECONDARY AND TERTIARY STRUCTURES  
TWEEN  $\gamma$ -45 AND  $\gamma$ -42.

$\gamma$  - GLIADIN 45



ELECTROPHORESIS

$\gamma$  - GLIADIN 42



ELECTROPHORESIS

- COMMON PEPTID OF  $\gamma$ -45 AND  $\gamma$ -42
- SPECIFIC PEPTID OF  $\gamma$ -45 AND  $\gamma$ -42
- GREATER PEPTID OF  $\gamma$ -45 OR  $\gamma$ -42

- ⊙ MIGRATION MARKER (ACID FUCHSINE)
- TRYPSIN

PARTIAL STRUCTURAL HOMOLGY  $\Rightarrow$  DIFFERENCES OF PRIMARY, SECONDARY AND TERTIARY STRUTURE OF  $\gamma$ -45 AND  $\gamma$ -42



## DISCUSSION

HYDROPHOBIC AREAS OF  $\gamma$ -45 WOULD BE :

- . FEWER THAN IN  $\gamma$ -42 (A.A., N.P.S, P,  $H\bar{\sigma}_{ave}$ )
- . LOCATED ON THE OUTSIDE OF THE MOLECULE (H.I.C : SURFACE HYDROPHOBICITY WAS FOUND SLIGHTLY HIGHER COMPARED TO  $\gamma$ -42)
- . LESS ACCESSIBLE, HOWEVER, THAN IN  $\gamma$ -42 (SOLUBILIZATION BY INCREASED AMOUNTS OF SOAP).

SUCH DIFFERENCES IN NUMBER, LOCATION AND ACCESSIBILITY OF HYDROPHOBIC AREAS AND IN TRIDIMENSIONAL STRUCTURE BETWEEN  $\gamma$ -GLIADINS 45 AND 42 (WHICH SHOULD MAKE DIFFERENCES IN THEIR AGGREGATIVE BEHAVIOUR) SUGGEST A POSSIBLE FUNCTIONAL ROLE, IN ADDITION TO THE GENETICAL LINKAGE TO QUALITY.



## PRESENT AND FUTURE INVESTIGATIONS :

- ISOLATE AND CHARACTERIZE OF  $\gamma$ -45 AND  $\gamma$ -42 m-RNA.
- EVIDENCE OTHER FUNCTIONAL SUBUNITS (LMW - GLUTENINS) OR COMPONENTS (LIPIDS) OF DURUM WHEATS.