

ROTHAMSTED
RESEARCH

A MICROSOMAL ESTERASE CONFERS INSECTICIDE RESISTANCE IN *SPODOPTERA LITTORALIS*

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SPODOPTERA LITTORALIS

- * A serious lepidopterous pest of several economically important crops such as cotton, corn, peanuts, vegetables and soybean.
- * Synthetic insecticides are often used in management programs to control lepidopterous pests in Turkey.
- * As a result, these pests have developed resistance to major classes of insecticides in many agroecosystems

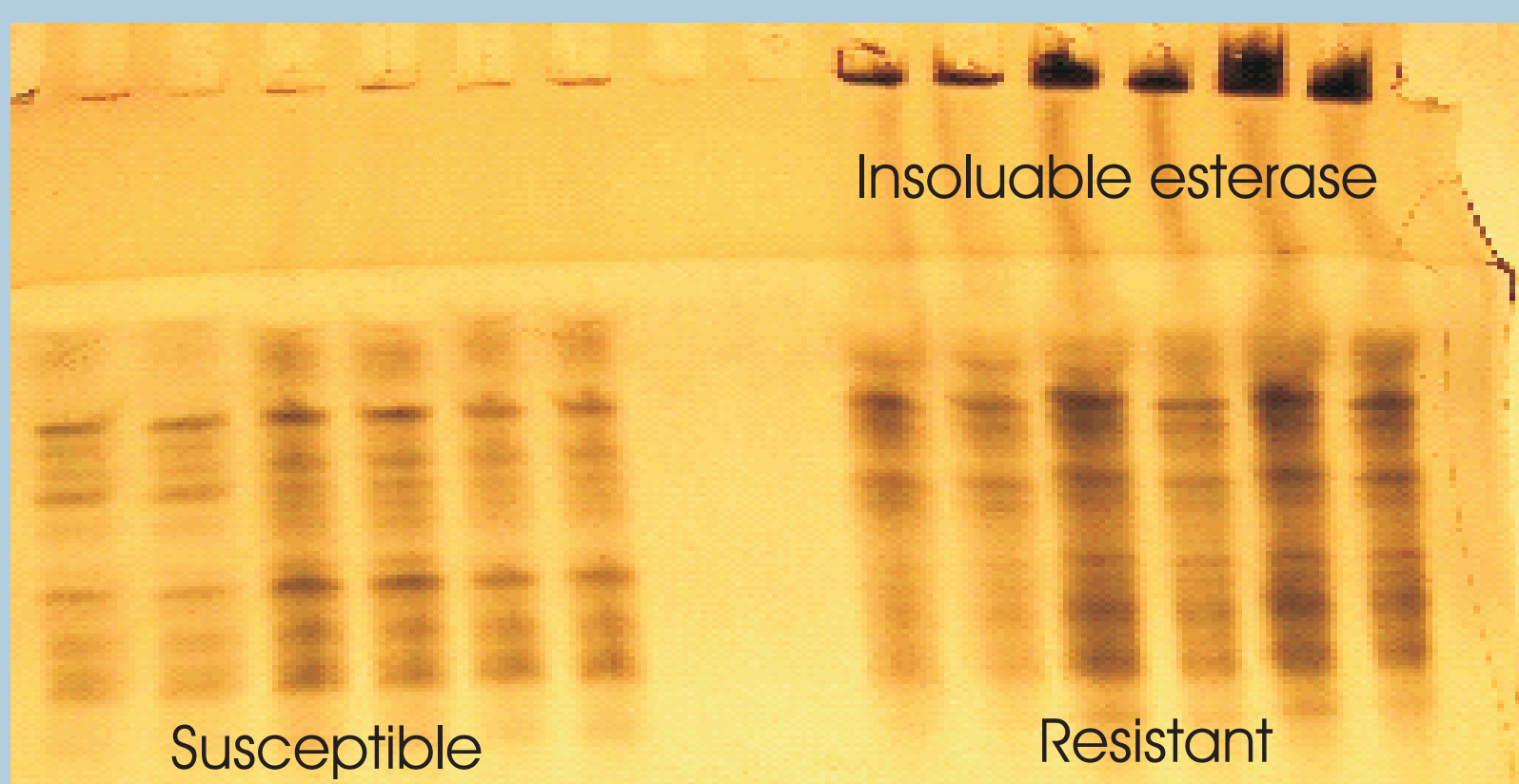


Lethal Concentration Values for Chlorpyrifos in Resistant and Susceptible *S.littoralis* Populations

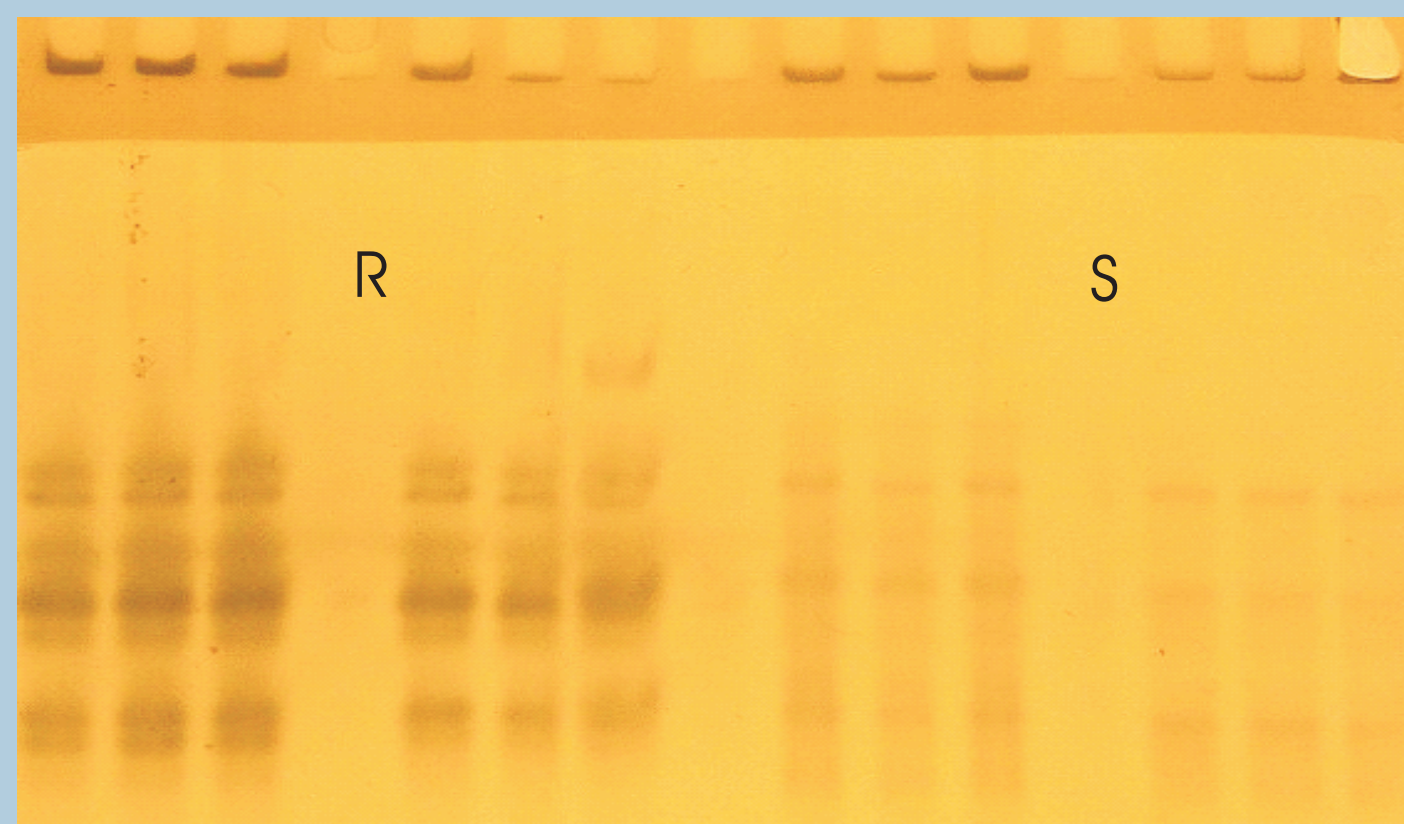
Population	Slope±SE	LD50	95 % FL	LD90	95% FL	RR
resistant	4.363±0.9	980	506– 1390	1928	1363 – 6540	9.0
susceptible	5.977±1.4	108	89 – 132	177	142 – 300	

Chlorpyrifos is often used to control *S.littoralis*. The LC50 values for chlorpyrifos of resistant and susceptible populations were 980 and 108 ppm respectively. These results indicated that the resistant population was 9 – fold less sensitive to chlorpyrifos than the susceptible population

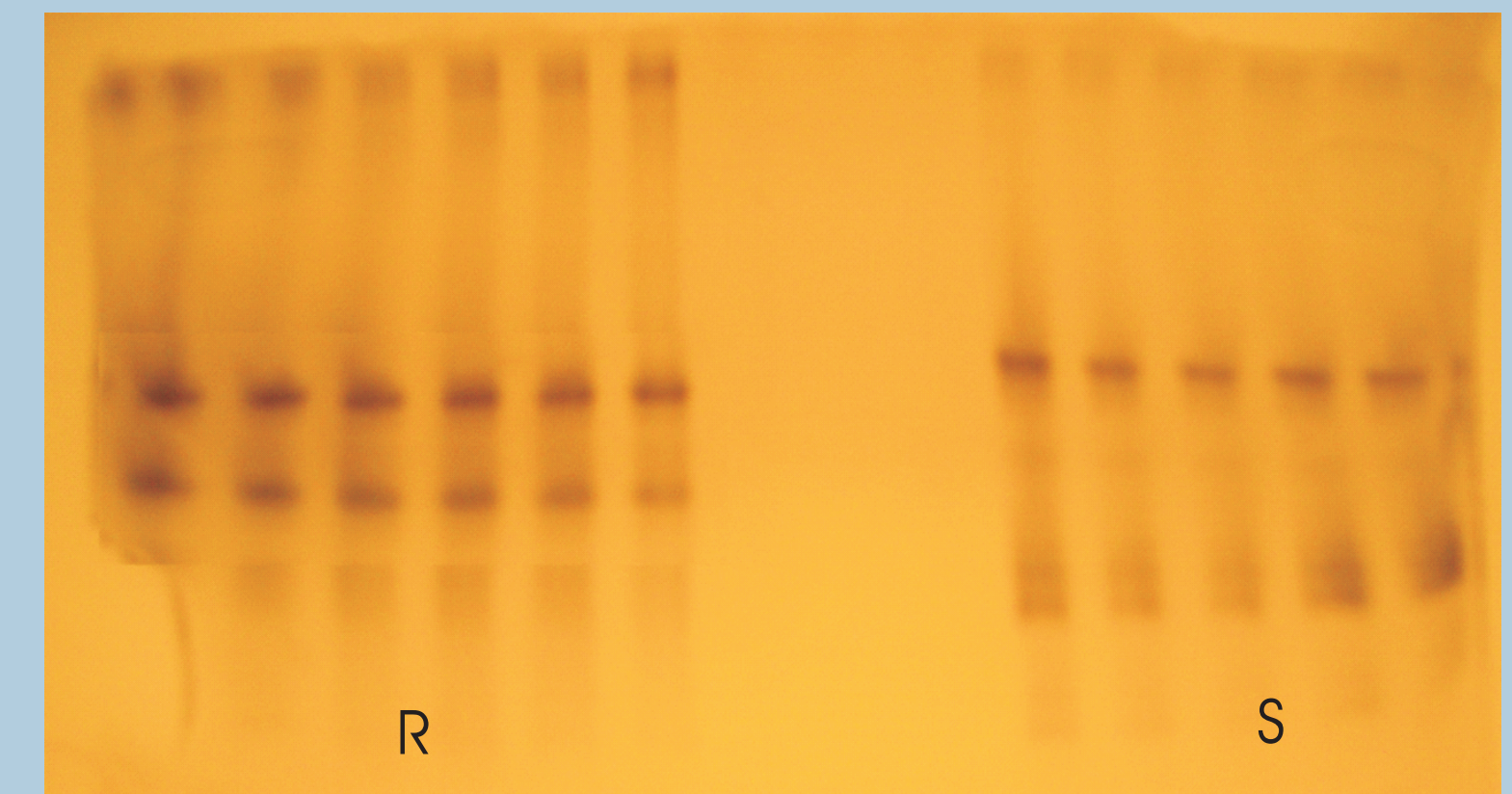
S.littoralis Esterase Isozymes



MICROSOMAL ESTERASE ISOSYMES (Microsomal pellet)



MICROSOMAL ESTERASE (Microsomal pellet + Triton X 100)



Non –denaturing PAGE analyses of whole insect general esterases from both the susceptible and resistant populations displayed multiple band of esterase when α -NA was used as substrate. There was a clear difference with insoluble esterase banding patterns between the two populations.

If microsomal pellet was resuspended in Triton, the insoluble esterase band disappeared. The resistance microsomal esterase pattern is different from the susceptible microsomal pattern.

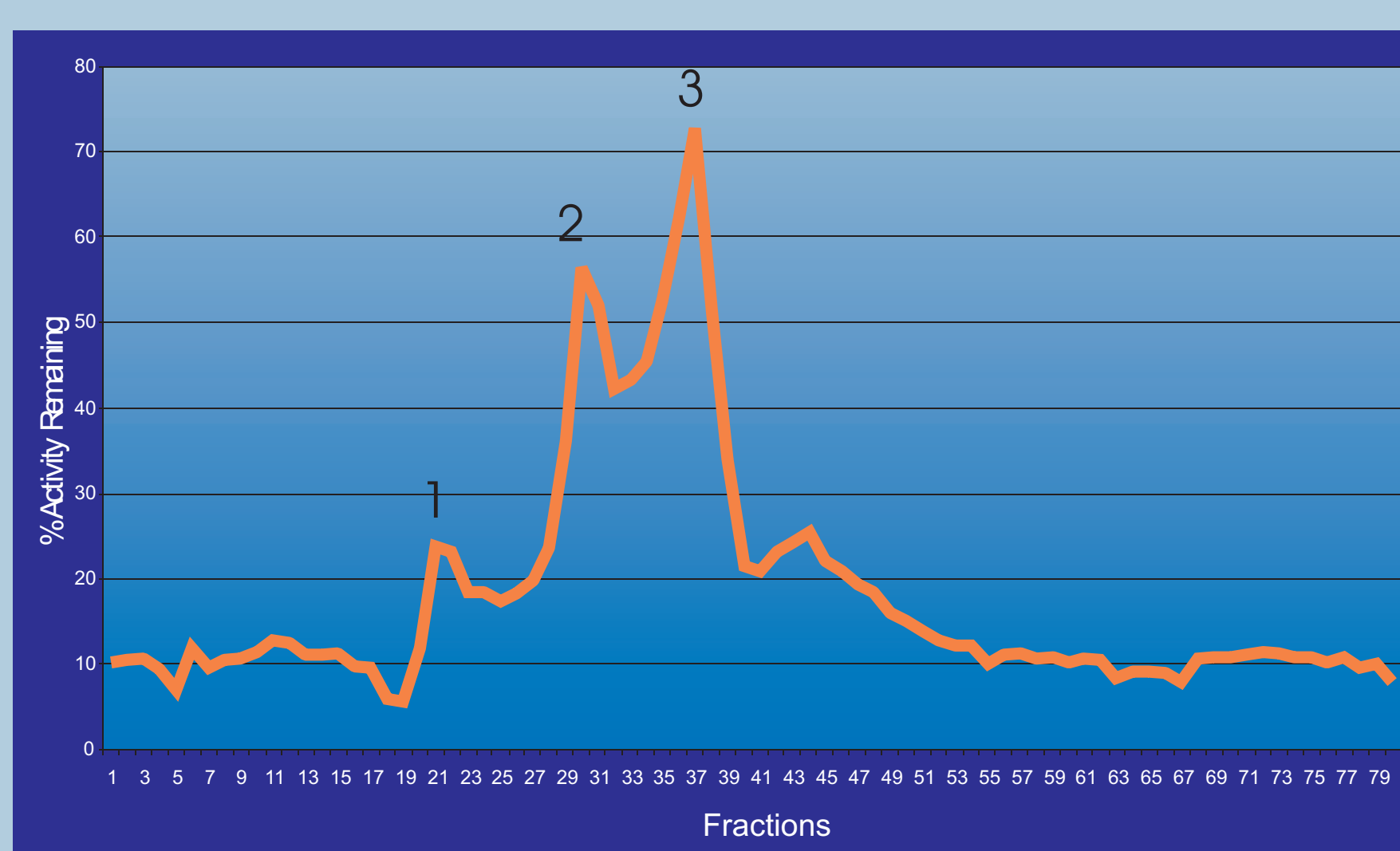
MICROSOMAL ESTERASE ACTIVITY

Sample	Rate (m.OD min ⁻¹)	Rate (mOD/min/ μ l)	Protein (μ g/ μ l)	Rate/ protein	Mean
RES.PEL	19.45	19.5	0.26	75.00	
RES.PEL	287.5	28.8	0.26	110.75	
RES.PEL	323.02	32.3	0.26	124.23	103.33**
SUS.PEL	1.782	1.8	0.13	13.8	
SUS.PEL	19.749	1.9	0.13	14.6	
SUS.PEL	21.619	2.1	0.13	16.6	15.00

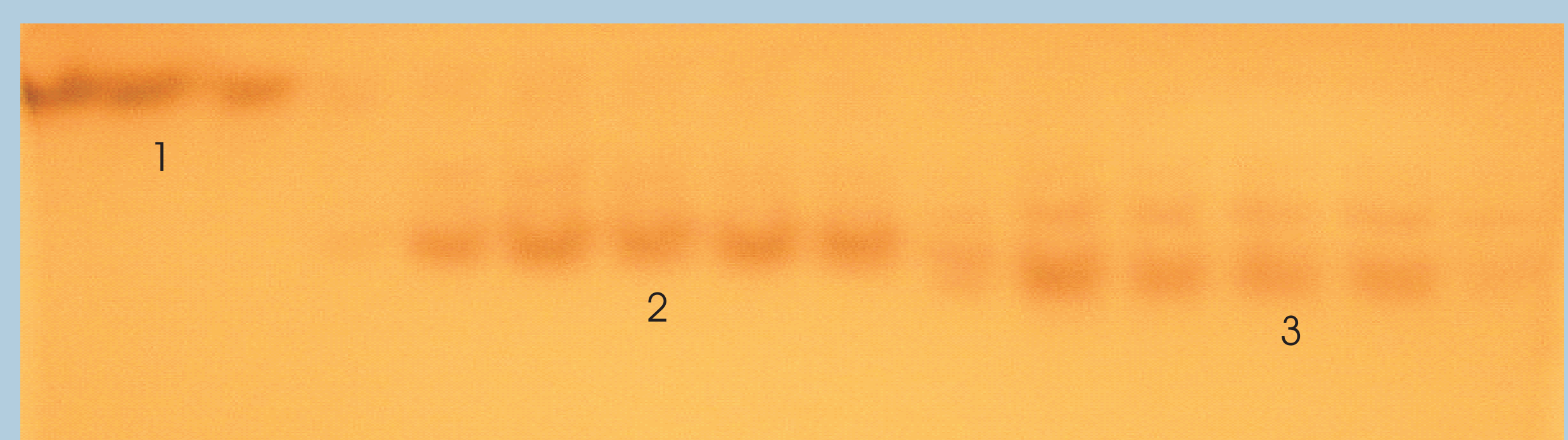
There was a significant difference between susceptible and resistance microsomes' esterase activities. This difference strongly suggests the resistant population microsome has a level of insoluble esterases. These results were supported by microsomal gel results.

For this reason we decided to purify the resistance – associated insoluble esterase from resistant population microsome

PURIFIED ESTERASE FRACTIONS ACTIVITY



Native PAGE GEL OF EACH ACTIVE PURIFIED FRACTION



Each fraction have one esterase band. Fraction two is the target esterase