

**40 th TOBACCO WORKER'S CONFERENCE  
PINEHURST, U.S.A., Jan. 2002**

**Assessment of Flue-cured and Burley  
breeding progress  
in France**

**VERRIER J.-L.\*, NOIREAU, J.-P.\*\*, JUBELY, J.\*,  
CAILLETEAU, B.\*, BARDON, J.-C.\*, VIDAL, B.\*\*\***

\* ALTADIS - Institut du tabac, 24100 Bergerac, France.

\*\* ANITTA, rue Painlevé, 24100 Bergerac, France

\* \*\*ALTADIS, SCR, 45 Les Aubrais, France.

**ANITTA**

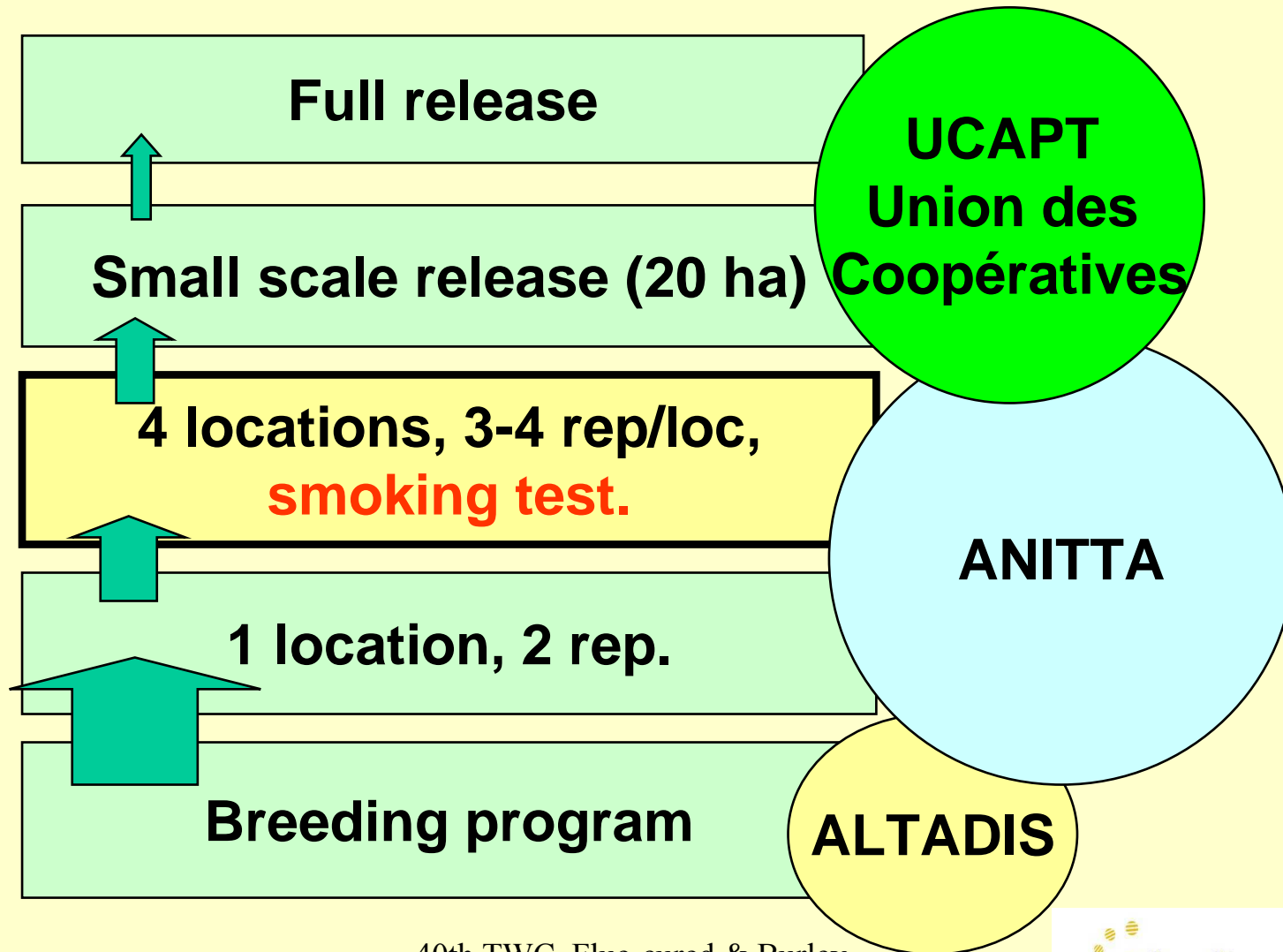
**Ass. Nat. Interprof. Techniques Tabac**

40th TWC, Flue-cured & Burley  
breeding progress in France



**Altadis**  
European Tobacco Company

# Tobacco varieties testing and release in France



40th TWC, Flue-cured & Burley  
breeding progress in France

## **General Methodology, 1989-2000, Flue-cured & Burley**

**Bergerac location**

**2 to 3 trials each year, 6 to 8 varieties/trial**

**4 replicates, RCB design**

**Leaf scoring (1-5) all leaf levels and replicates,  
3 expert panels (UCAPT, ITB, ALTADIS)**

**Representative sampling for chemical analysis,  
several leaf levels, replicates separated.**

**Replicates gathered for smoking test (ISO 3308)  
and sensory evaluation**

## File clustering results by Year/Trial/Variety

Année	Essai	Variété	Brut	Iqn	Alc	Cen	Nt	No3						nic/cig		Goud/cig		NNN	NAT	NAB	NNK	TSNA
									nic	norn	anat	anab	myo	nic/cig	Goud/cig							
1997	D9707	BB16A	3091	71	3,6	24,7	3,6	2,0	5,1						3,90	16,14	1,50	1,10				2,60
1997	D9709	BB16A	3176	77	3,8	24,1	3,4	1,4	4,9						3,27	14,52	0,80	0,70				1,50
1998	D9807	BB16A	3664	71	3,6	23,0	3,7	2,1														
1998	D9808	BB16A	3343	76	4,1	21,1	4,1	2,1														
1998	D9810	BB16A	3599	76	3,4	22,4	3,7	1,9	4,6	0,2	0,2	0,0	0,0	1,98	12,29	1,01	0,83				0,15	1,99
1999	D9907	BB16A	3260	69	2,1	22,9	2,9	0,6	2,5	0,1	0,1					0,32	0,24				0,24	0,80
1999	D9908	BB16A	3481	83	2,2	24,9	3,8	3,1	2,3	0,1	0,1					0,41	0,34				0,10	0,85
1999	D9910	BB16A	3337	67	2,8	22,8	3,4	1,1	3,3	0,1	0,2			2,38	13,54	0,70	0,42				0,31	1,42
2000	D0005	BB16A	3199	71	5,3	19,2	4,3	0,4	5,7	0,2	0,4	0,02	0,01			0,40	0,36					0,82
2000	D0006	BB16A	2892	79	4,7	19,8	4,3	0,3	5,4	0,1	0,4	0,02	0,01	4,37	16,35	0,40	0,71	0,00	0,00			1,11
1991	D9119	ITB 2204	3765	86	3,2		4,1	3,8						3,12	17,50							
1992	D9211	ITB 2204	3408	86	2,2	23,9	3,0	1,1						1,85	14,39							
1993	D9309	ITB 2204	3898	63	2,3	24,8	3,9	3,4						1,42	11,05							
1994	D9408	ITB 2204	3441	60	3,1	23,6	3,2	1,6						3,34	16,61							
1996	D9608	ITB 2204	3295	72	1,9	25,2	3,3	2,4						1,12	10,83							
1997	D9708	ITB 2204	3753	66	2,3	25,5	2,8	1,6	3,7					1,72	12,73	1,00	0,70					1,70
1998	D9809	ITB 2204	4163	71	2,9	24,0	3,6	2,3	3,5	0,1	0,1	0,0	0,0	1,32	11,16	0,52	0,68				0,16	1,36

## Variety effect assessment : General Linearised Model Regression

**Y = constant term**

**+ year effect**

**+ (trial in year) effect**

**+ variety effect**

**+ résiduel**

**Variations linked to**

- climatic differences
- agronomic differences
- leaf sampling differences
- method evolution for chemical analysis

**Only explained by genetic or seed differences**

**Error + (Year x Variety) interaction**

## Data processing

Complete data 45 x 298

Extraction --> 26 x 236  
varieties tested 2 times or more (except newest)  
variables complete over all results

Example  
Burley  
data

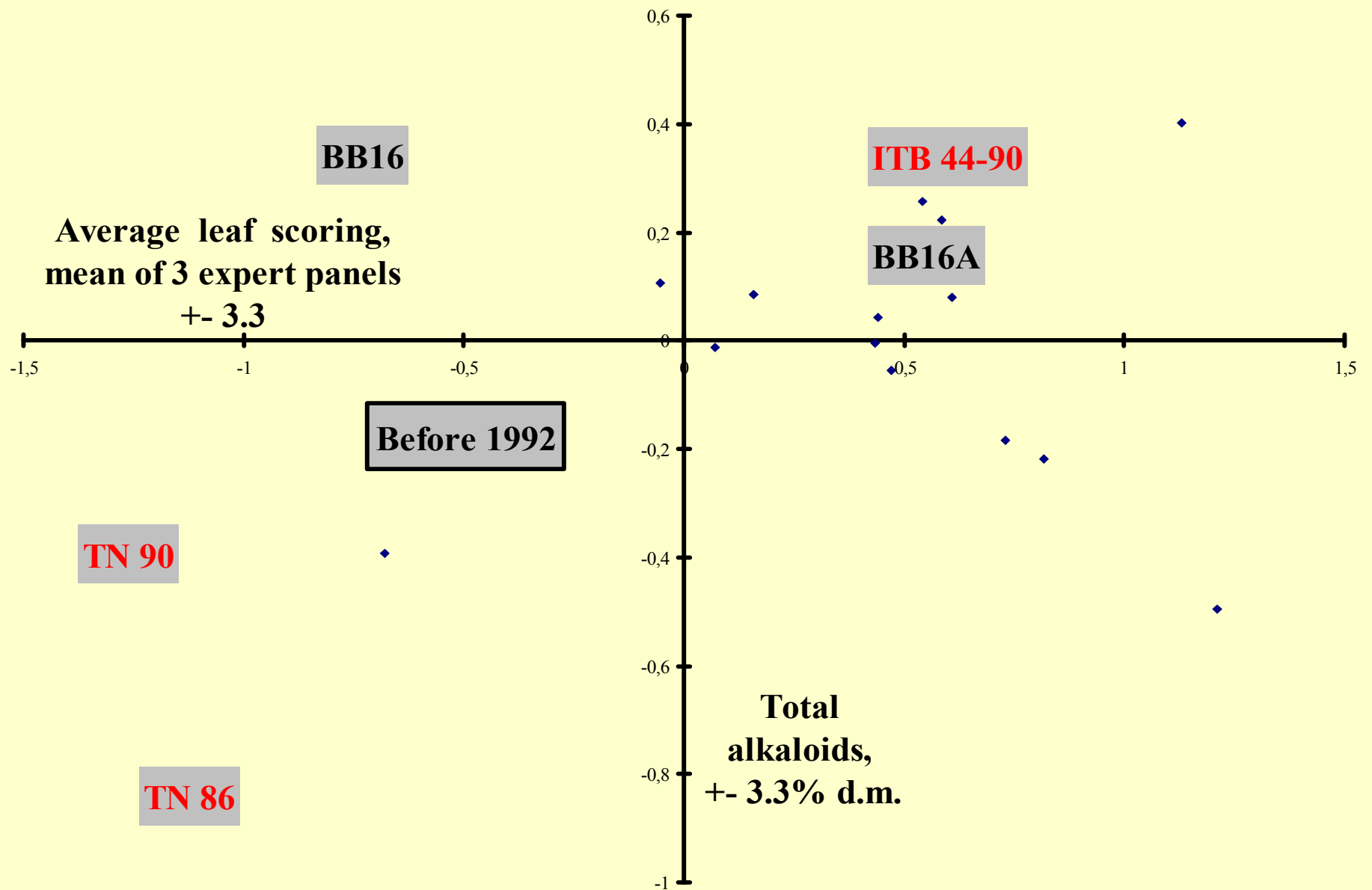
GLM regression 26 variables (Statgraphics/Uniwin)

Table of variety effects  
92 varieties x 26 variables

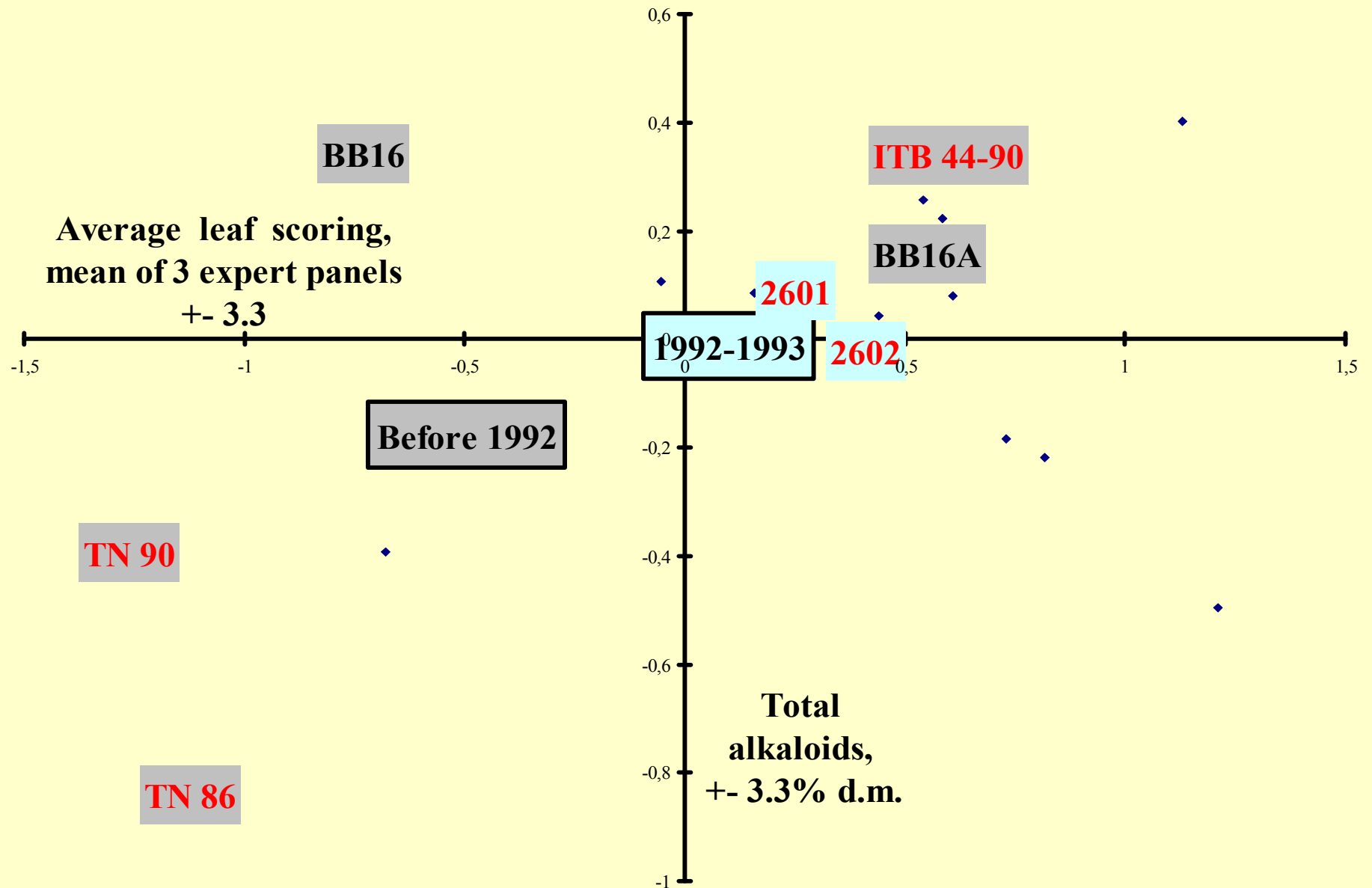
Grouping varieties according to **Year of Entry** in trial

Mean by group (<92, 92-93, 94-98, 99-2000)  
and individual data for released varieties

Burley var., Bergerac, 1989-2000 **red = resistant Black root rot + PVY**

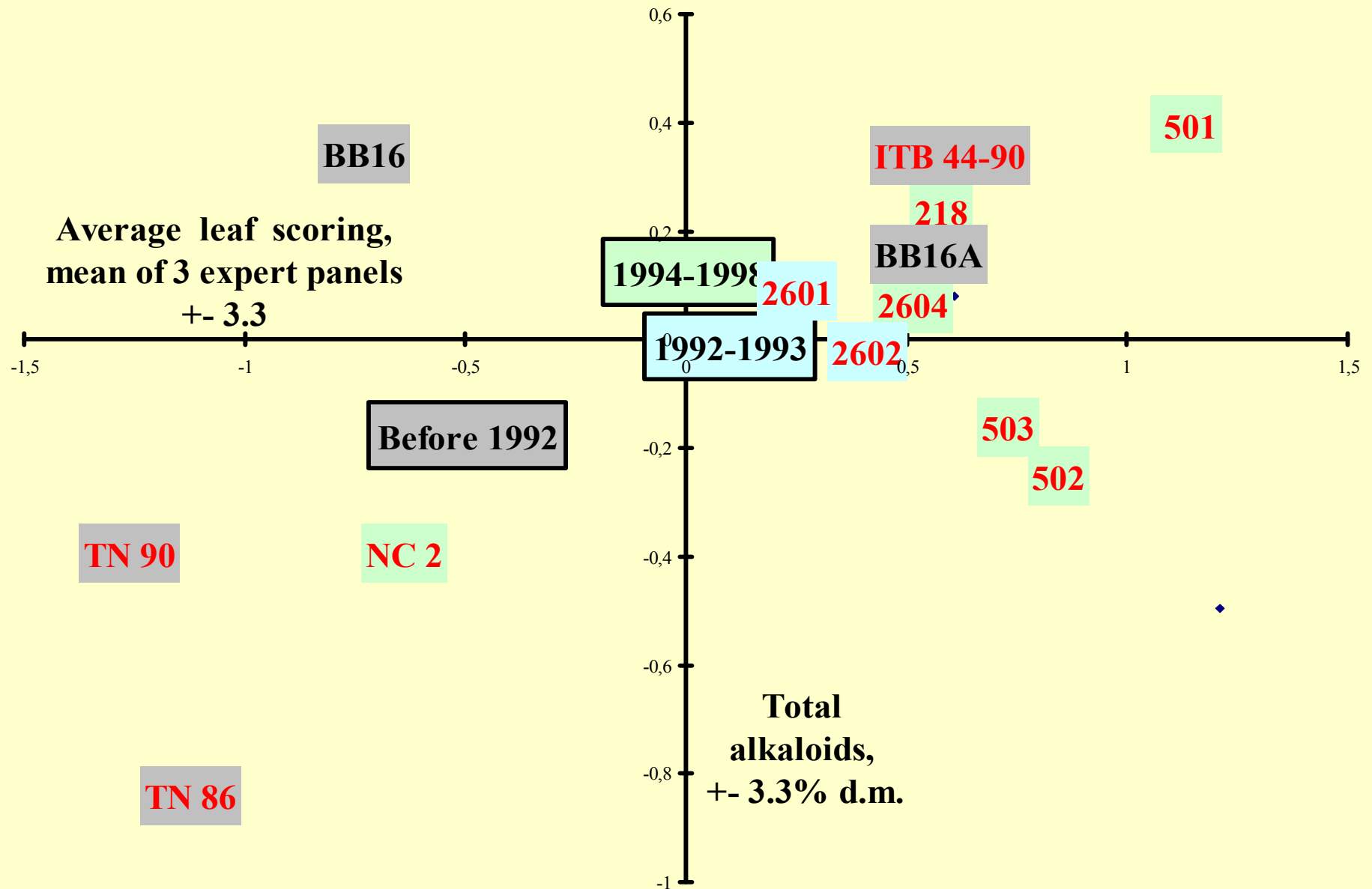


Burley var., Bergerac, 1989-2000 **red = resistant Black root rot + PVY**

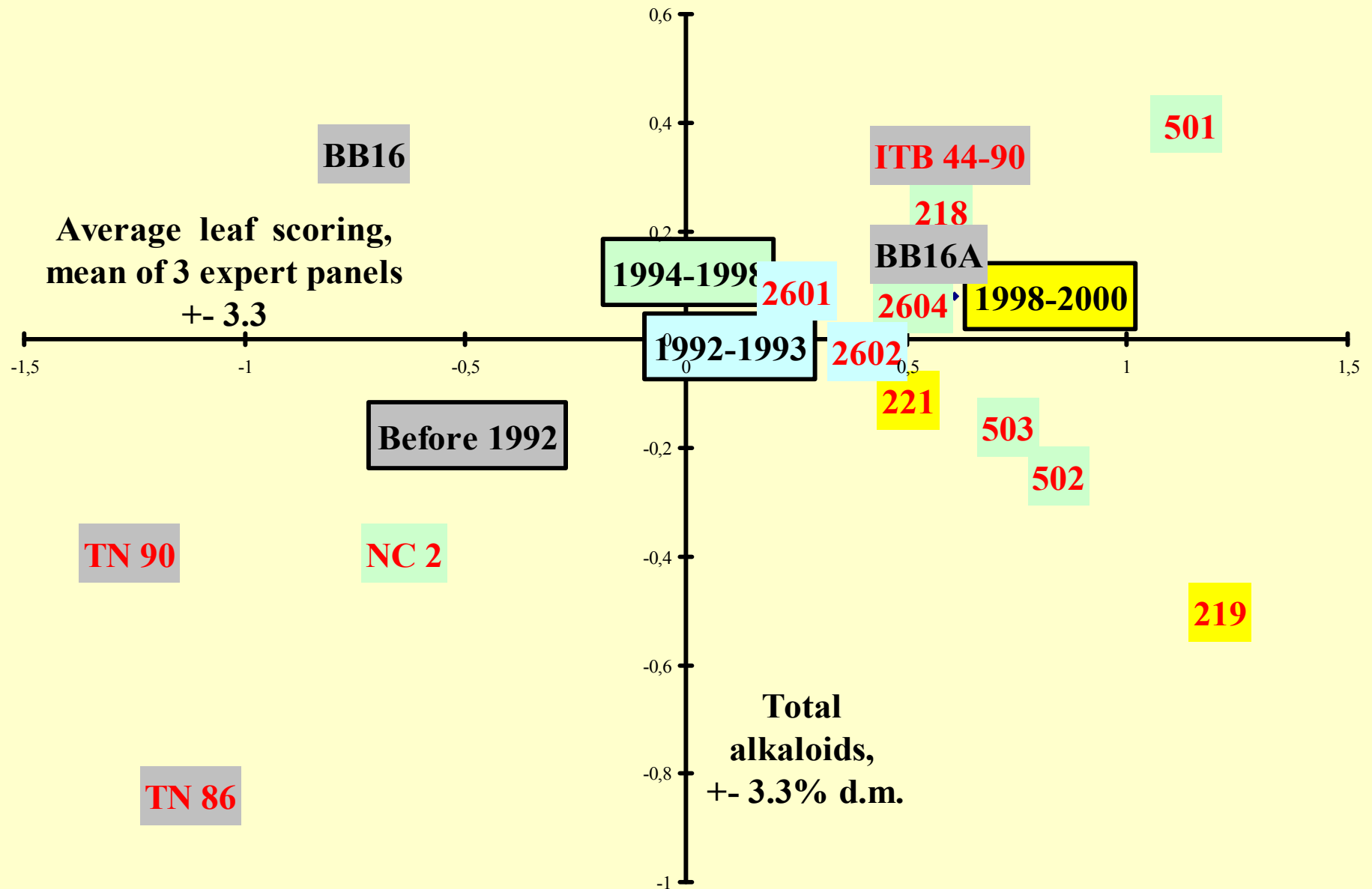




**Burley var., Bergerac, 1989-2000** red = resistant Black root rot + PVY

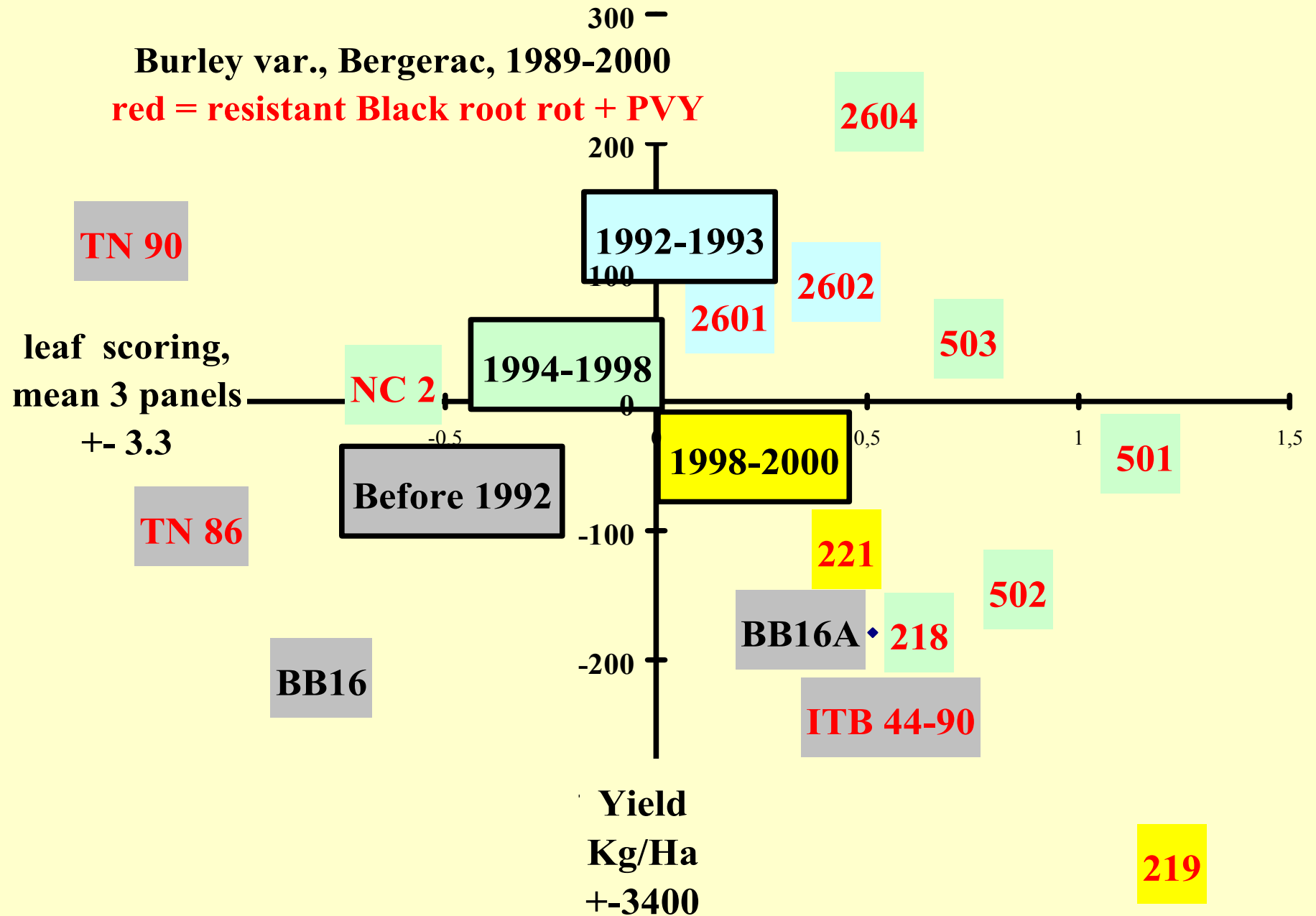


**Burley var., Bergerac, 1989-2000** red = resistant Black root rot + PVY



Burley var., Bergerac, 1989-2000

red = resistant Black root rot + PVY



**Burley var., Bergerac, 1989-2000**

**red = res. Black root rot + PVY**

leaf scoring,  
3 expert panels

+/- 3.3

**TN 90**

**TN 86**

**BB16**

**NC 2**

-0,5  
<92

0  
94-97

**BB16A**

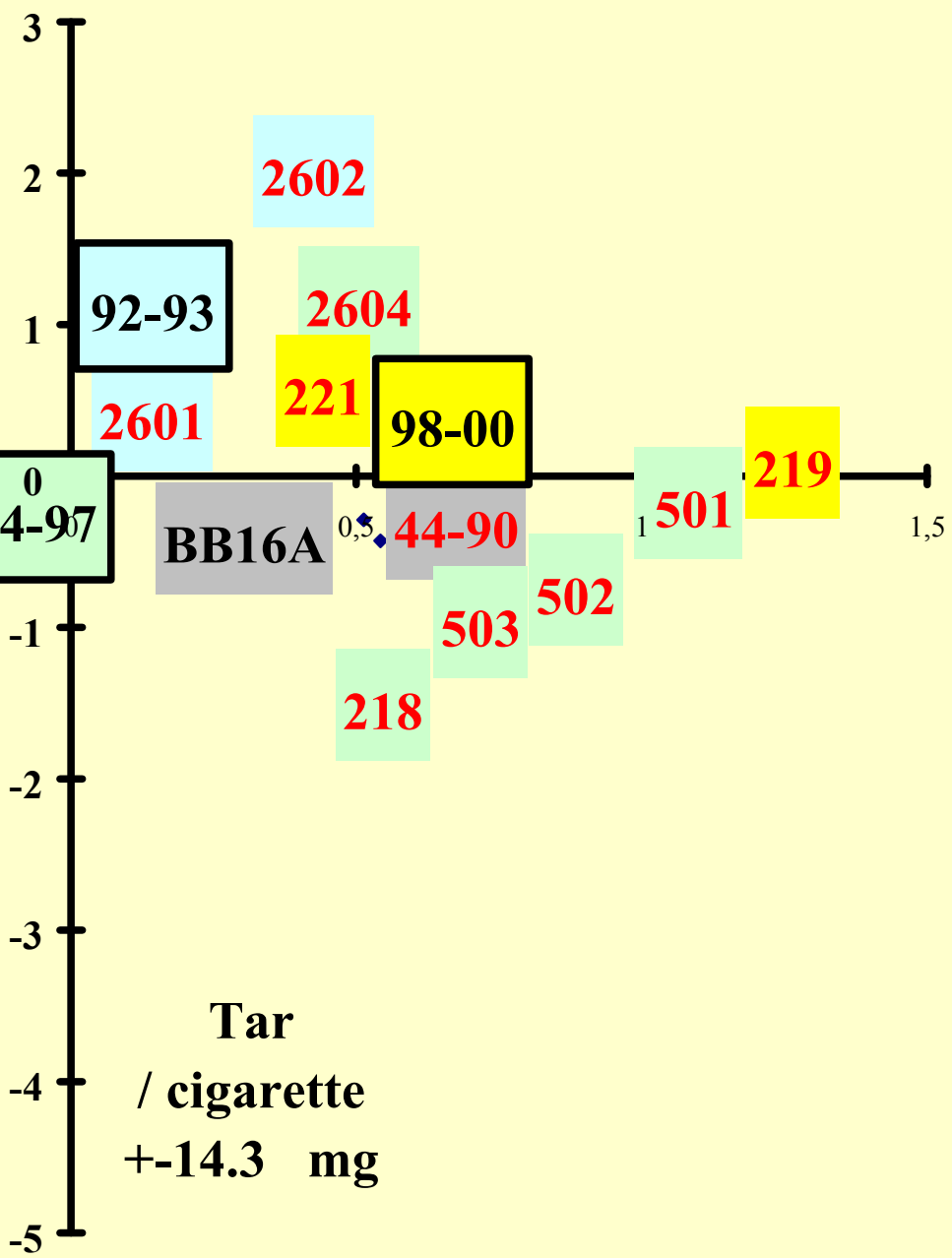
0,5

**44-90**

1

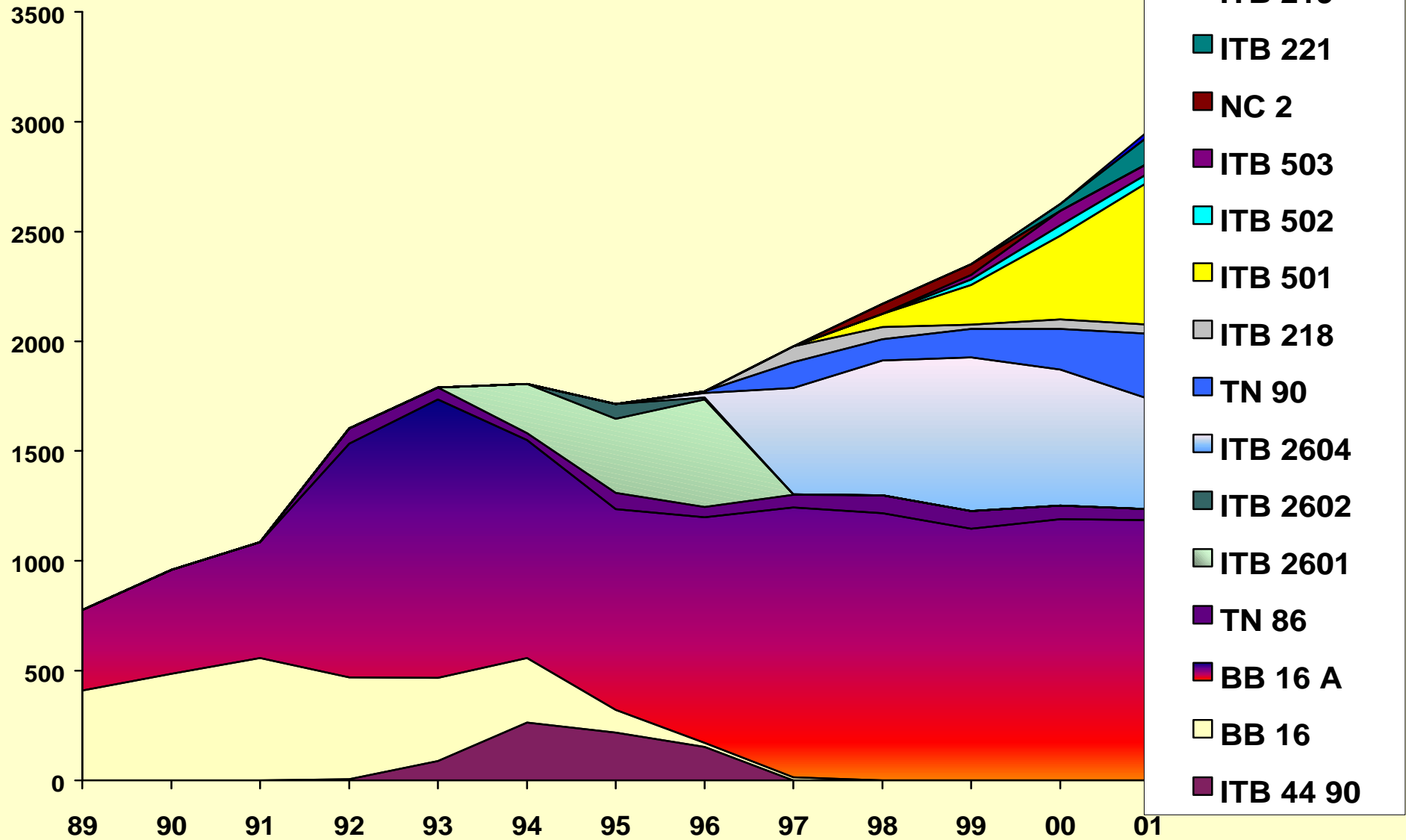
**501**

1,5



**Tar**  
/ cigarette  
+/-14.3 mg

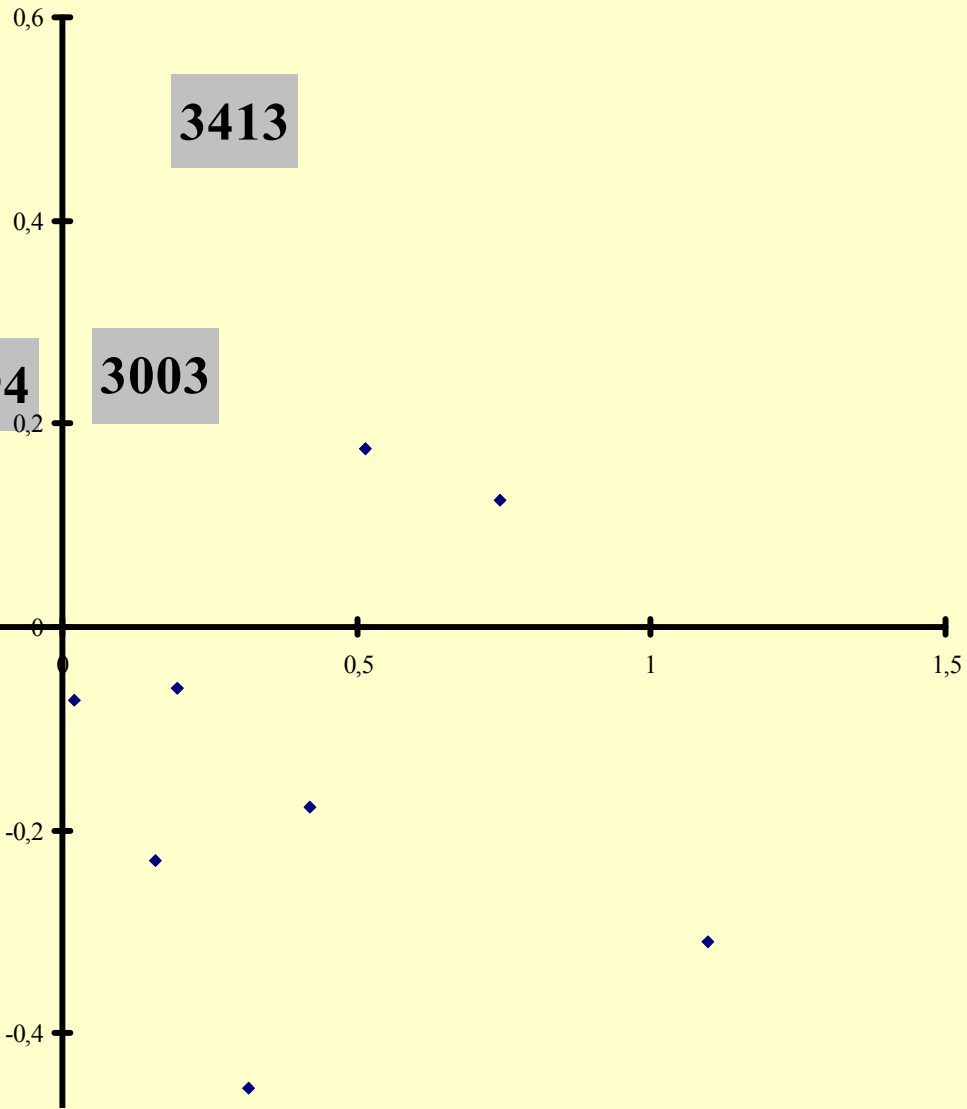
# Evolution of aromatic Burley acreage, France 1989-2001



40th TWC, Flue-cured & Burley  
breeding progress in France

**Flue-cured 1989-2000 Bergerac**  
**red = res. Black Root Rot + PVY**

**K326**



**Leaf quality scoring,  
mean of 3 panels**

**30**

**3308**

**before 1994**

**3003**

**3413**

**VD**

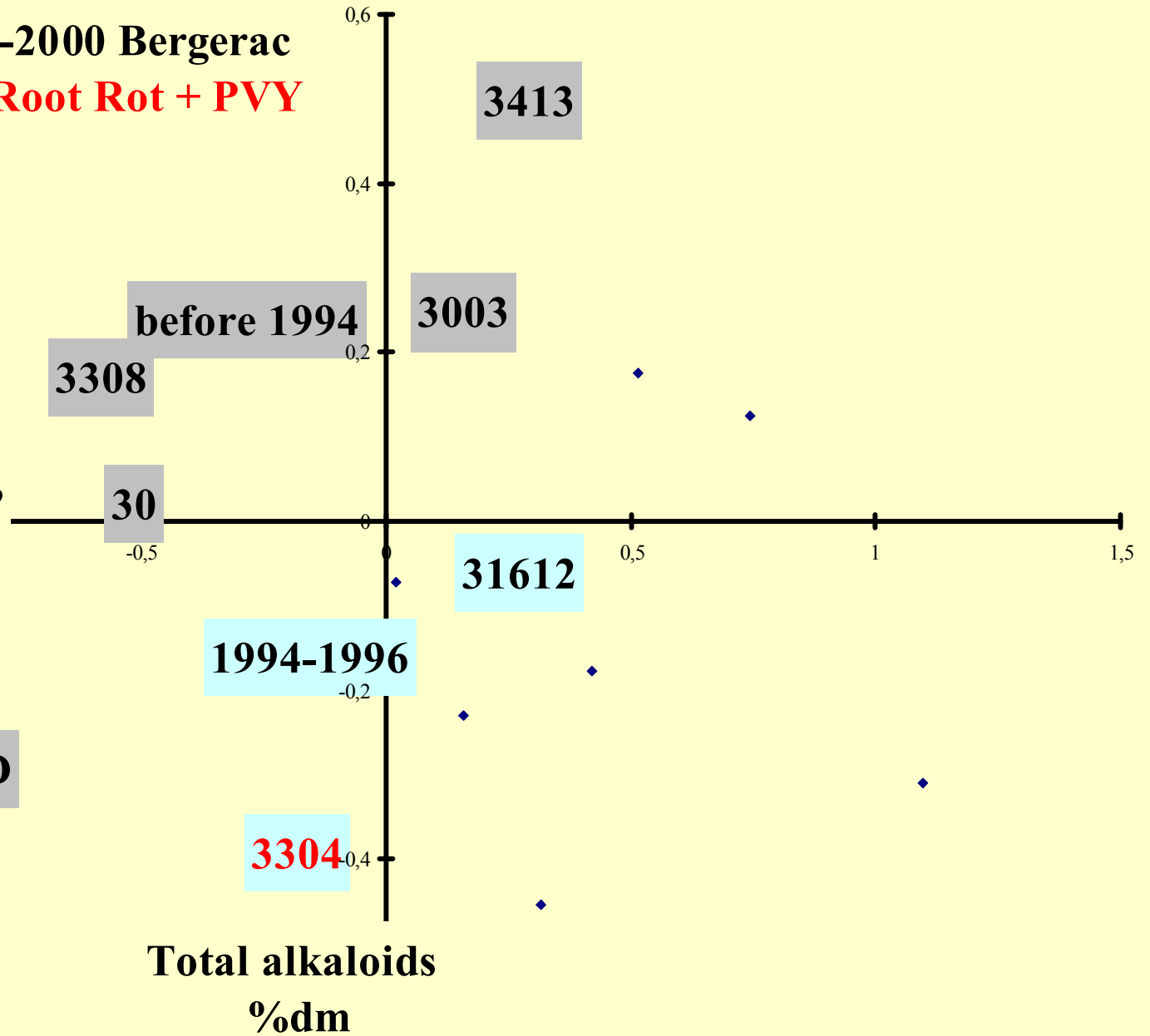
**Total alkaloids  
%dm**

breeding progress in France

Flue-cured 1989-2000 Bergerac  
red = res. Black Root Rot + PVY

K326

Leaf quality scoring,  
mean of 3 panels

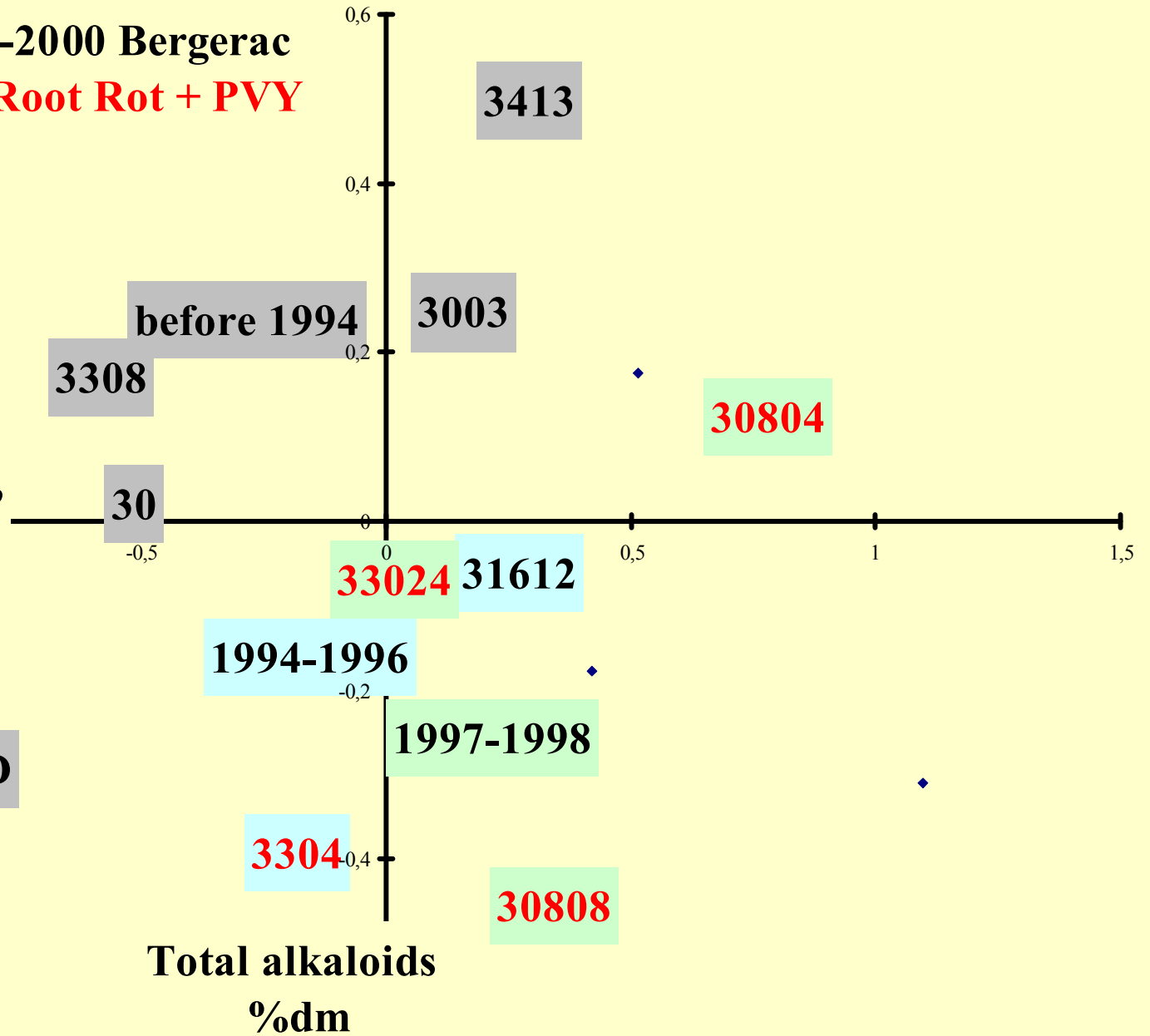


breeding progress in France

Flue-cured 1989-2000 Bergerac  
red = res. Black Root Rot + PVY

K326

Leaf quality scoring,  
mean of 3 panels



Total alkaloids  
%dm

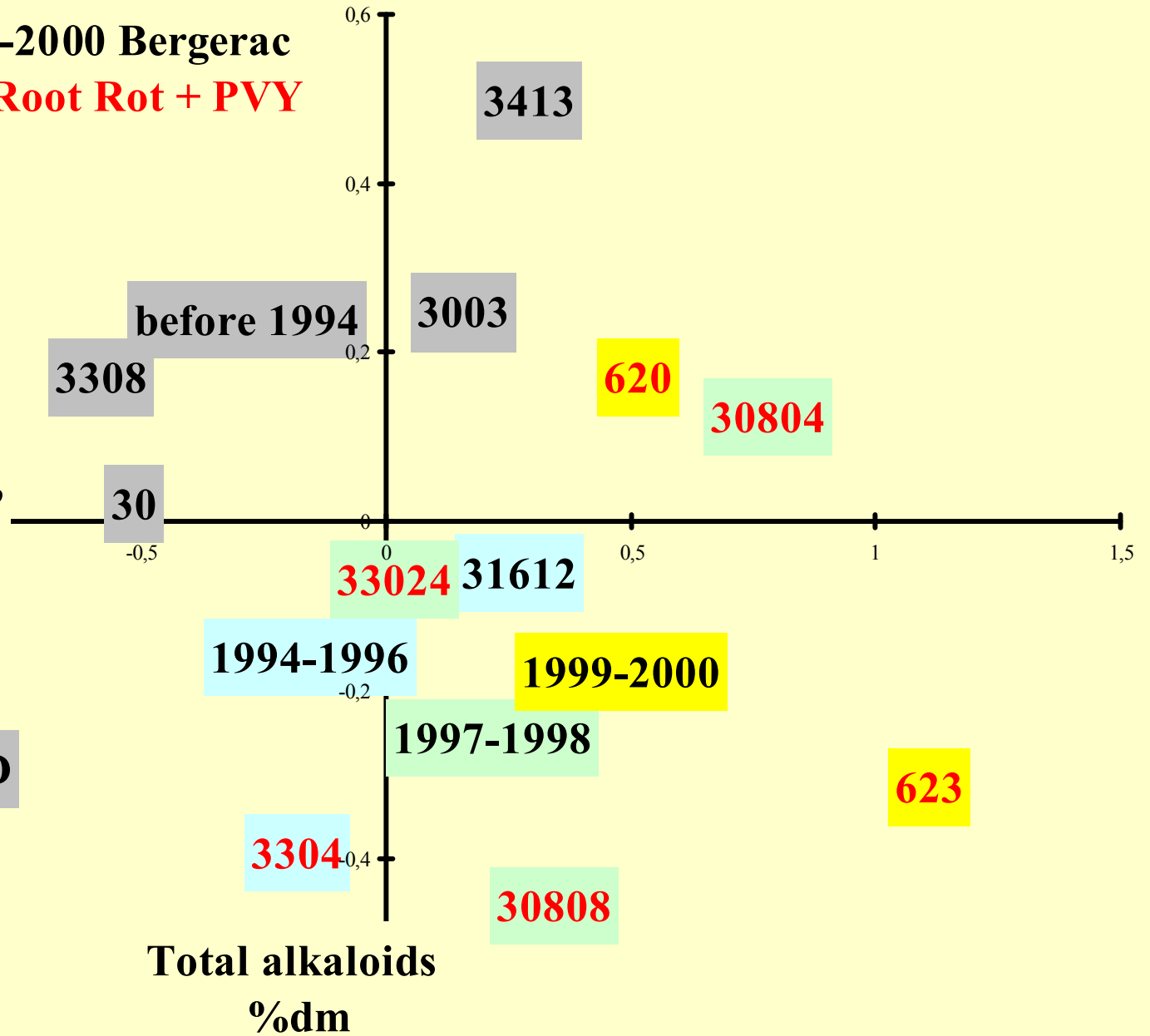
breeding progress in France



Flue-cured 1989-2000 Bergerac  
red = res. Black Root Rot + PVY

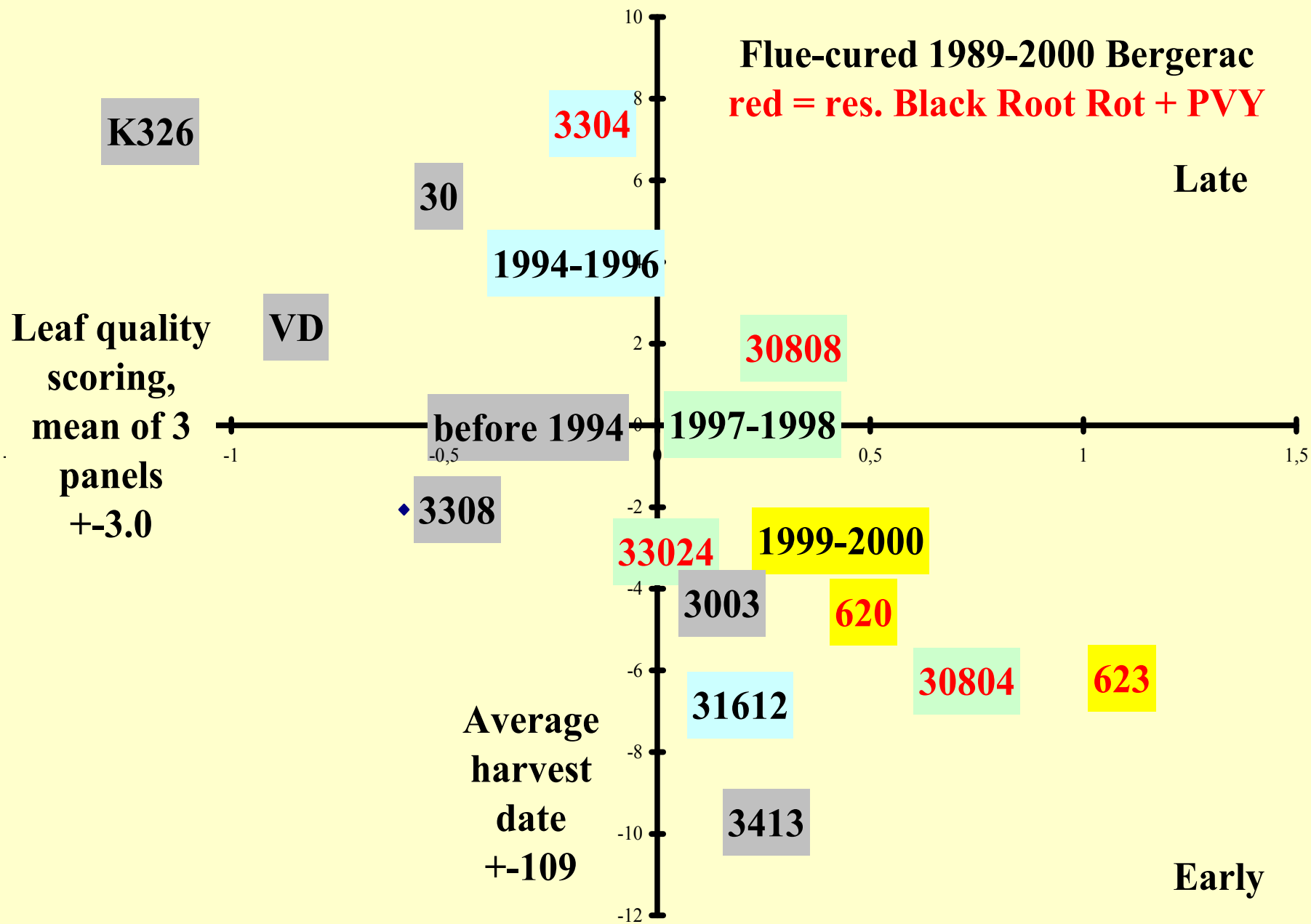
K326

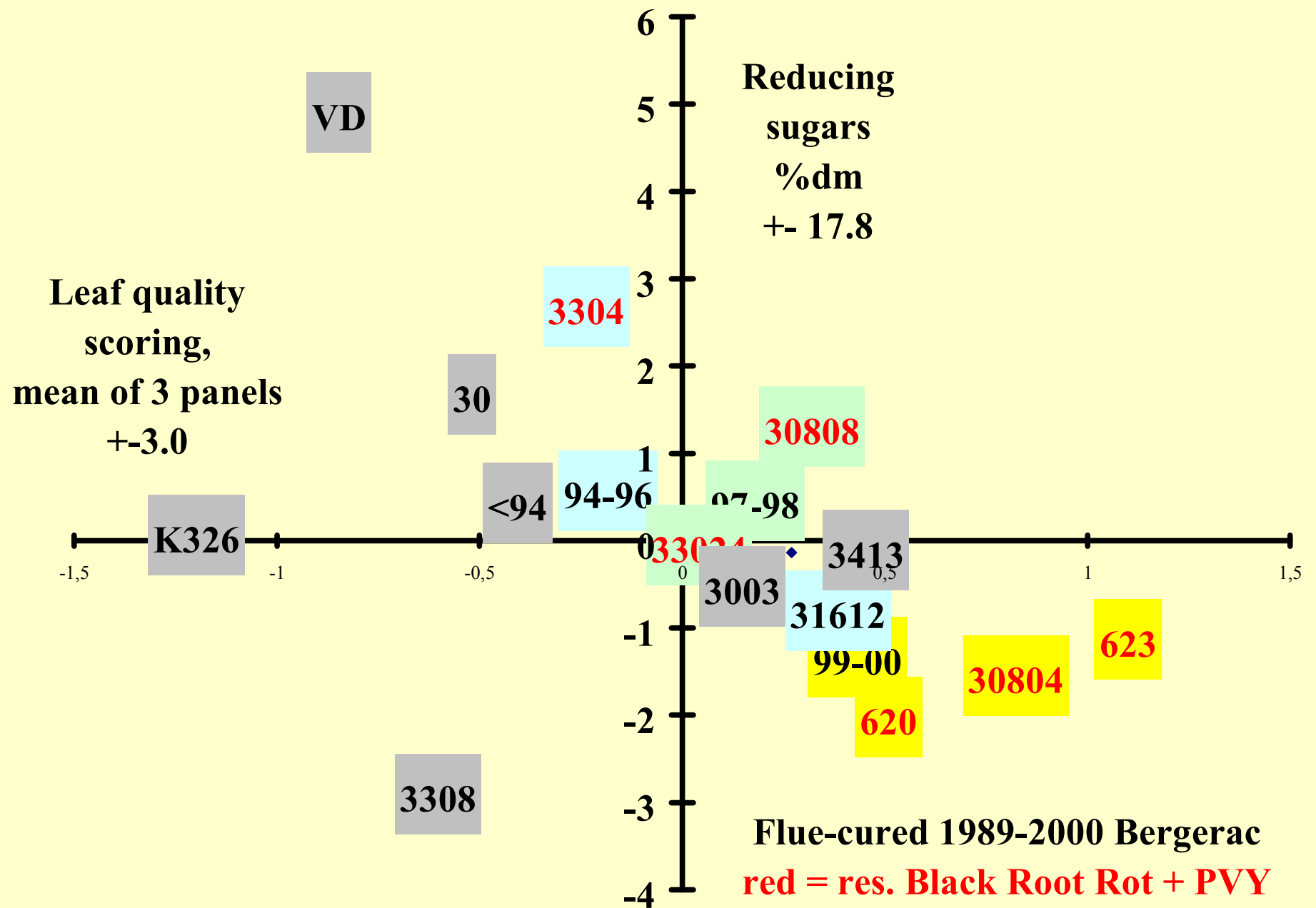
Leaf quality scoring,  
mean of 3 panels

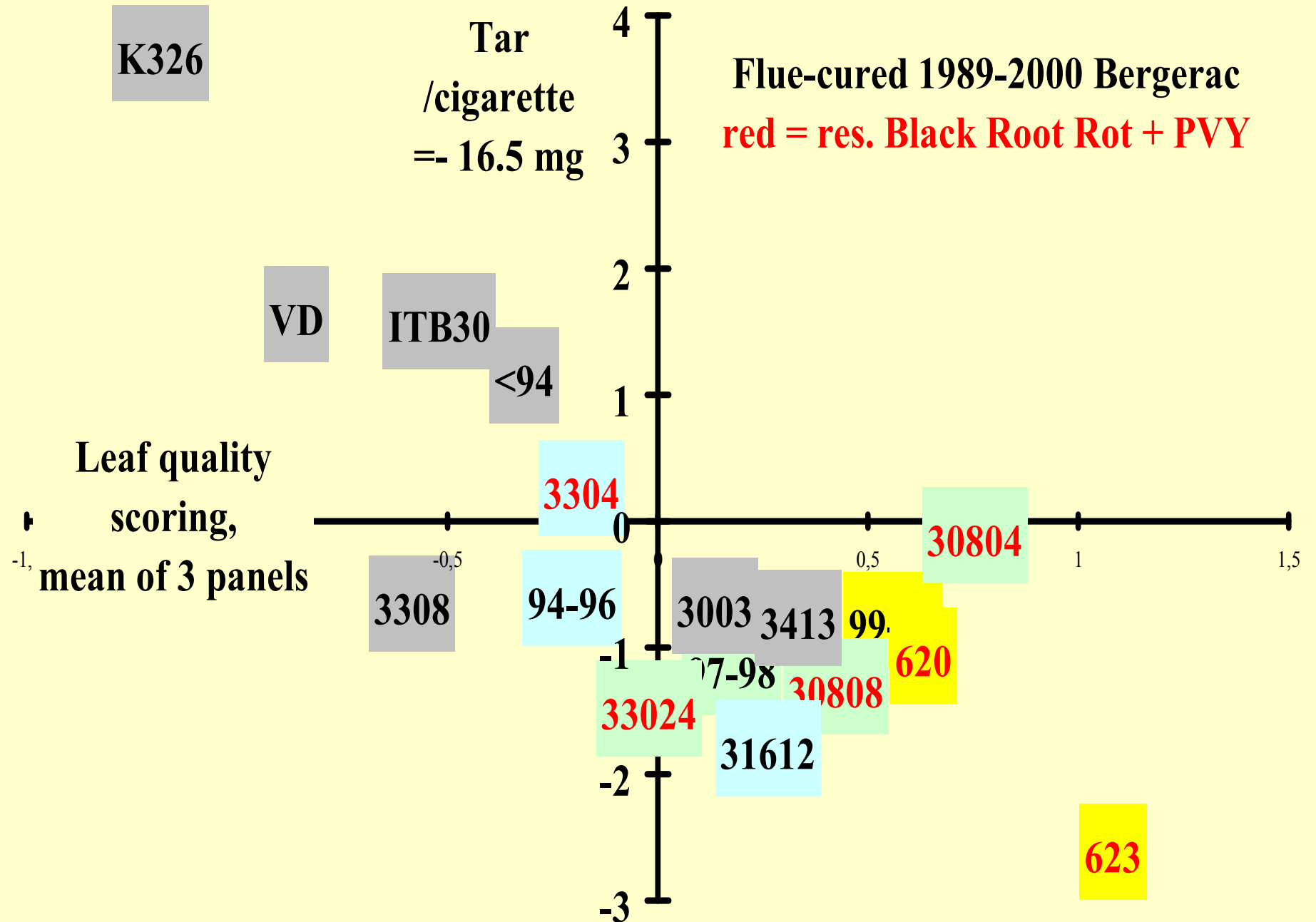


Total alkaloids  
%dm

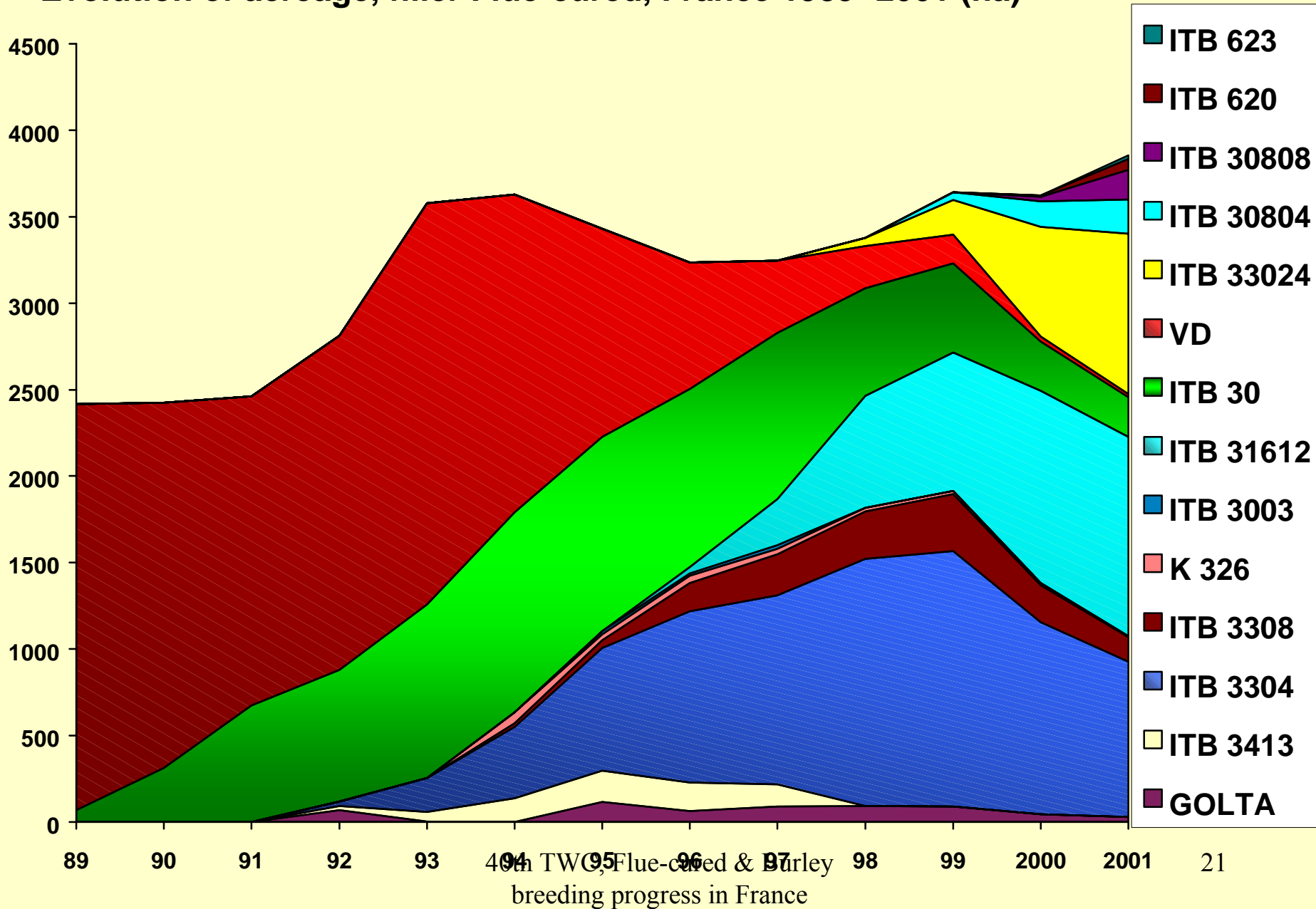
breeding progress in France







Evolution of acreage, filler Flue-cured, France 1989- 2001 (ha)



# Conclusion

**Efficient breeding progress for :**

- leaf quality,
- early leaf maturity

**No increase (Burley) or decrease (Flue-Cured)  
of alkaloid content**

**Significant decrease  
of sugar content and tar potential  
in Flue-cured**

**Generalisation of necessary disease resistances  
in French conditions makes these progresses  
effective in the leaf processing factory**