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90/W/NB/2 Varieties, *Rhizobium* and N - Navy Beans

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90/W/NB/2

NAVY BEANS

VARIETIES, RHIZOBIUM AND N

Object: To study the responses of five varieties of navy beans to Rhizobium inoculation and nitrogen fertilizer - Woburn, Great Hill Bottom I.

Sponsors: J.M. Day, M.L. Lovell.

Design: 3 randomised blocks of 80 plots.

Whole plot dimensions: 1.5 x 3.0.

Treatments: All combinations of:-

1. **VARS IT** Varieties used in inoculation test:

ALBION
EDMUND
SAJA X1
SAJA X2
SEAFARER

2. **INOCULUM** Inoculants of Rhizobium phaseoli applied as granules with the seed:

NONE
I 1 RCR 3622
I 2 RCR 3639
I 3 CIAT 274
I 4 CIAT 632
I 5 PGRO 1

3. **N** Nitrogen fertilizer (kg N) as 'Nitro-Chalk' to seedbed:

0
40

together with all combinations of:-

1. **VARS NT** Varieties, uninoculated, used in nitrogen test:

ALBION
EDMUND
SAJA X1
SAJA X2
SEAFARER

2. **N R T** Nitrogen rates (kg N) as 'Nitro-Chalk' and times:

80 S 80 broadcast to seedbed
120 S 120 broadcast to seedbed
160 S 160 broadcast to seedbed
160S+80F 160 broadcast to seedbed + 80 at flowering

90/W/NB/2

Basal applications: Manures: (0:24:24) at 200 kg. Weedkillers: Paraquat at 0.80 kg ion in 220 l. Trifluralin at 0.84 kg in 220 l. Monolinuron at 0.56 kg in 220 l. Fungicide: Benomyl at 0.55 kg in 220 l. Irrigation 24 mm: (12 mm applied on two occasions).

Seed: Sown at 40 seeds per square metre.

Cultivations, etc.:- Ploughed: 22 Nov, 1989. Paraquat applied: 3 May, 1990. PK applied: 18 May. Spring-tine cultivated: 21 May. Trifluralin applied and cultivated: 22 May. Seed sown: 23 May. Seedbed N applied: 24 May. Monolinuron applied: 31 May. Irrigation applied: 1 and 20 June. Fungicide applied: 22 Aug. Hand harvested and threshed by stationary combine harvester: 27 Oct. Previous crops: S. wheat 1988, s. barley 1989.

NOTES: (1) Times of flowering were noted.
(2) 19 plots failed to mature enough for combine harvesting and the yields were lost, those with treatment combinations

VAR	IT	ALBION	SEAFARER	ALBION	SEAFARER	ALBION	ALBION
INOCULUM		I 2	I 3	I 4	I 1	I 3	NONE
N		0	40	0	40	40	40

VAR	IT	SAJA X1	SEAFARER	SAJA X2	ALBION	SAJA X1
INOCULUM		NONE	I 4	I 2	I 5	I 2
N		40	40	0	40	0

VAR	NT	SEAFARER	EDMUND	SAJA X2	SAJA X1
N R T		160S+80F	80 S	120 S	160S+80F

VAR	NT	SEAFARER	SAJA X2	ALBION	SEAFARER
N R T		160 S	160S+80F	160S+80F	80 S

Estimated values were used in the analysis.

GRAIN (AT 85% DRY MATTER) TONNES/HECTARE

***** Tables of means *****

INOCULUM	NONE	I 1	I 2	I 3	I 4	I 5	Mean
VAR							
IT							
ALBION	2.75	2.76	2.82	2.65	3.04	2.51	2.75
EDMUND	2.97	2.76	3.06	2.27	2.60	2.93	2.77
SAJA X1	2.18	2.26	2.02	1.91	2.03	1.90	2.05
SAJA X2	2.21	2.39	2.50	2.29	2.70	2.80	2.48
SEAFARER	3.09	2.85	2.72	2.78	2.82	3.07	2.89
Mean	2.64	2.60	2.63	2.38	2.64	2.64	2.59

90/W/NB/2

GRAIN (AT 85% DRY MATTER) TONNES/HECTARE

***** Tables of means *****

	N	0	40	Mean
VARS IT				
ALBION		2.76	2.75	2.75
EDMUND		2.72	2.81	2.77
SAJA X1		1.98	2.13	2.05
SAJA X2		2.40	2.57	2.48
SEAFARER		2.85	2.92	2.89

Mean 2.54 2.64 2.59

	N	0	40	Mean
INOCULUM				
NONE		2.51	2.77	2.64
I 1		2.48	2.72	2.60
I 2		2.53	2.72	2.63
I 3		2.44	2.32	2.38
I 4		2.61	2.67	2.64
I 5		2.67	2.62	2.64

Mean 2.54 2.64 2.59

VARS IT	INOCULUM	N	0	40
ALBION	NONE		2.48	3.02
	I 1		2.53	2.98
	I 2		2.69	2.95
	I 3		2.98	2.32
	I 4		3.11	2.97
	I 5		2.75	2.27
EDMUND	NONE		2.96	2.99
	I 1		2.62	2.89
	I 2		2.76	3.37
	I 3		2.37	2.17
	I 4		2.49	2.70
	I 5		3.11	2.75
SAJA X1	NONE		1.88	2.48
	I 1		2.17	2.34
	I 2		2.16	1.88
	I 3		1.79	2.04
	I 4		2.06	2.01
	I 5		1.80	2.01
SAJA X2	NONE		2.20	2.22
	I 1		2.31	2.48
	I 2		2.38	2.62
	I 3		2.35	2.22
	I 4		2.41	3.00
	I 5		2.74	2.86
SEAFARER	NONE		3.03	3.15
	I 1		2.79	2.90
	I 2		2.64	2.80
	I 3		2.73	2.83
	I 4		2.98	2.65
	I 5		2.93	3.21

90/W/NB/2

GRAIN (AT 85% DRY MATTER) TONNES/HECTARE

***** Tables of means *****

N R T	80 S	120 S	160 S	160S+80F	Mean
VAR S NT					
ALBION	2.58	2.67	2.64	2.51	2.60
EDMUND	2.70	3.26	2.92	2.42	2.83
SAJA X1	2.26	1.55	1.68	2.18	1.92
SAJA X2	2.45	2.37	2.02	2.47	2.33
SEAFARER	3.17	2.40	2.65	3.44	2.92
Mean	2.63	2.45	2.38	2.61	2.52

GRAND MEAN 2.57

*** Standard errors of differences of means ***

INOCULUM	VAR S IT	N	VAR S NT
0.107	0.098	0.062	0.169
N R T	INOCULUM	N	N
	VAR S IT	VAR S IT	INOCULUM
0.151	0.239	0.138	0.151
N R T	INOCULUM		
VAR S NT	VAR S IT	N	
0.338	0.338		

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	153	0.414	16.1

GRAIN MEAN DM% *

PLOT AREA HARVESTED 0.00045