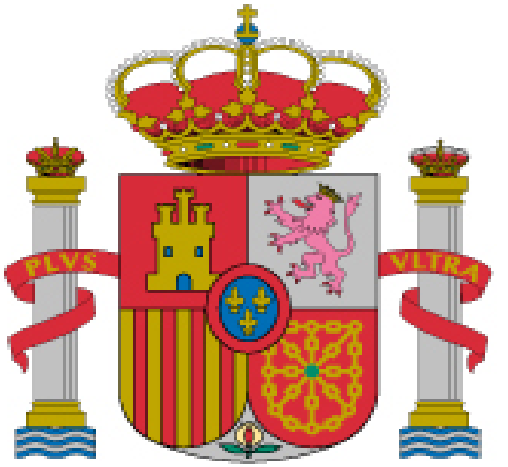
BIOMASS PRODUCTION CHAIN AND GROWTH SIMULATION MODEL FOR KENAF,1º meeting

1ºPart



Contract Nº: QLk5-CT2002-01729

Sowing time, cultivar, plant population and N2 fertilizer on Kenaf in central penisula iberica

by

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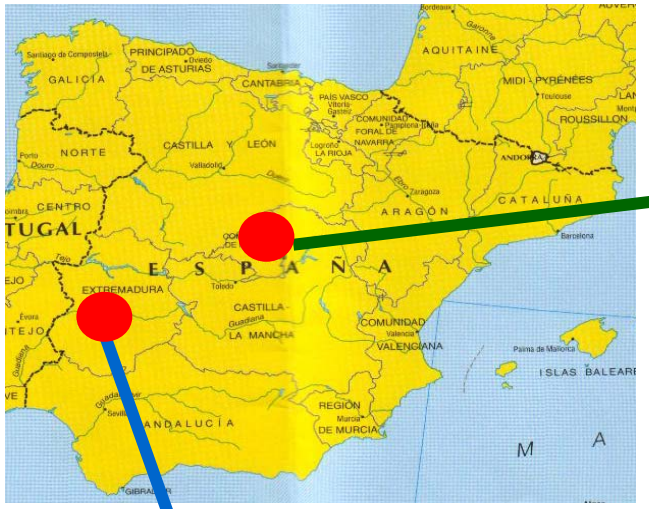

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Task 2.3: Effect of irrigation and nitrogen fertilization on biomass yields

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Task 2.2: Effect of different sowing dates and plant population on biomass yields

Kenaf establish crop under irrigation

Kenaf irrigation plot at establish time of the crop

Kenaf sowing date plot

Kenaf half irrigated plot

Kenaf irrigation plot at 1.75 m hight

Kenaf during harvesting time rows

Kenaf during harvesting time rows

Kenaf yielding Spanish Varieties and Localities

Town County Year Cultivar Cycle Tm/ha

Localización	Provincia	Año	Cultivar	Ciclo**	Producción**
Écija	Sevilla	1992	PI-921	P	13.0
Écija	Sevilla	1992	Everglades 71	T	17.0
Écija	Sevilla	1992	Salvador	MT	14.7
Xirzo de Limia	Orense	1992	PI-129	P	12.1
Xirzo de Limia	Orense	1992	Salvador	MT	11.8
Villaconejos de Trabaque	Cuenca	1992	Salvador	MT	11.5
San Fulgencio/Rafal	Alicante	1993	Salvador	MT	21.3
Alcalá del Río	Sevilla	1994	PI-142	P	13.6
Alcalá del Río	Sevilla	1994	Tainung 1	T	14.6
Alcalá del Río	Sevilla	1994	Salvador	MT	14.6
C.C.A. Moraleja	Cáceres	1995	Tainung1	T	32.0
C.C.A. Moraleja	Cáceres	1995	Everglades 71	T	30.2
C.C.A. Moraleja	Cáceres	1995	Salvador	MT	31.2
Alcalá del Río	Sevilla	1995	PI-142	P	19.2
Alcalá del Río	Sevilla	1995	Tainung 1	T	18.5
Alcalá del Río	Sevilla	1995	Salvador	MT	21.4
Finca "La Orden"	Badajoz	1996	Tainung 1	T	24.1
Finca "La Orden"	Badajoz	1996	Everglades 71	T	23.8
Finca "La Orden"	Badajoz	1996	Salvador	MT	31.0
Alcalá del Río	Sevilla	1996	PI-142	P	25.5
Alcalá del Río	Sevilla	1996	Tainung 1	T	28.7
Alcalá del Río	Sevilla	1996	Salvador	MT	32.9

P= Eearly
T= Late
MT= VeryLate

Kenaf sowing time, cultivars, plant population, target for trial and year

Table 1. Sowing time, cultivar and target plant population for each trial and year

Sowing time trials			
Year	Sowing time	Cultivar	Plant population (plants m^{-2})
1991	13 May, 3 June, 1 July	El Salvador	30
1992	18 May, 1 June, 1 July	El Salvador	40
Plant population × cultivar trials			
Year	Sowing time	Cultivar	Plant population (plants m^{-2})
1991	13 May	El Salvador	15
	13 May	El Salvador	30
	13 May	El Salvador	60
	13 May	PI-343129	15
	13 May	PI-343129	30
	13 May	PI-343129	60
1992	5 June	El Salvador	20
	5 June	El Salvador	40
	5 June	El Salvador	60
	5 June	Everglades 71	20
	5 June	Everglades 71	40
	5 June	Everglades 71	60
	5 June	PI-343129	15
	5 June	PI-343129	30
	5 June	PI-343129	60
1993	1 June	El Salvador	20
	1 June	El Salvador	40
	1 June	El Salvador	60
	1 June	Everglades 71	20
	1 June	Everglades 71	40
	1 June	Everglades 71	60
Nitrogen fertilizer trials			
Year	Sowing time	Cultivar	Plant population (plants m^{-2})
1991	13 May	El Salvador	30
1992	5 June	El Salvador	40
1993	1 June	El Salvador	40

Environmental Local Conditions

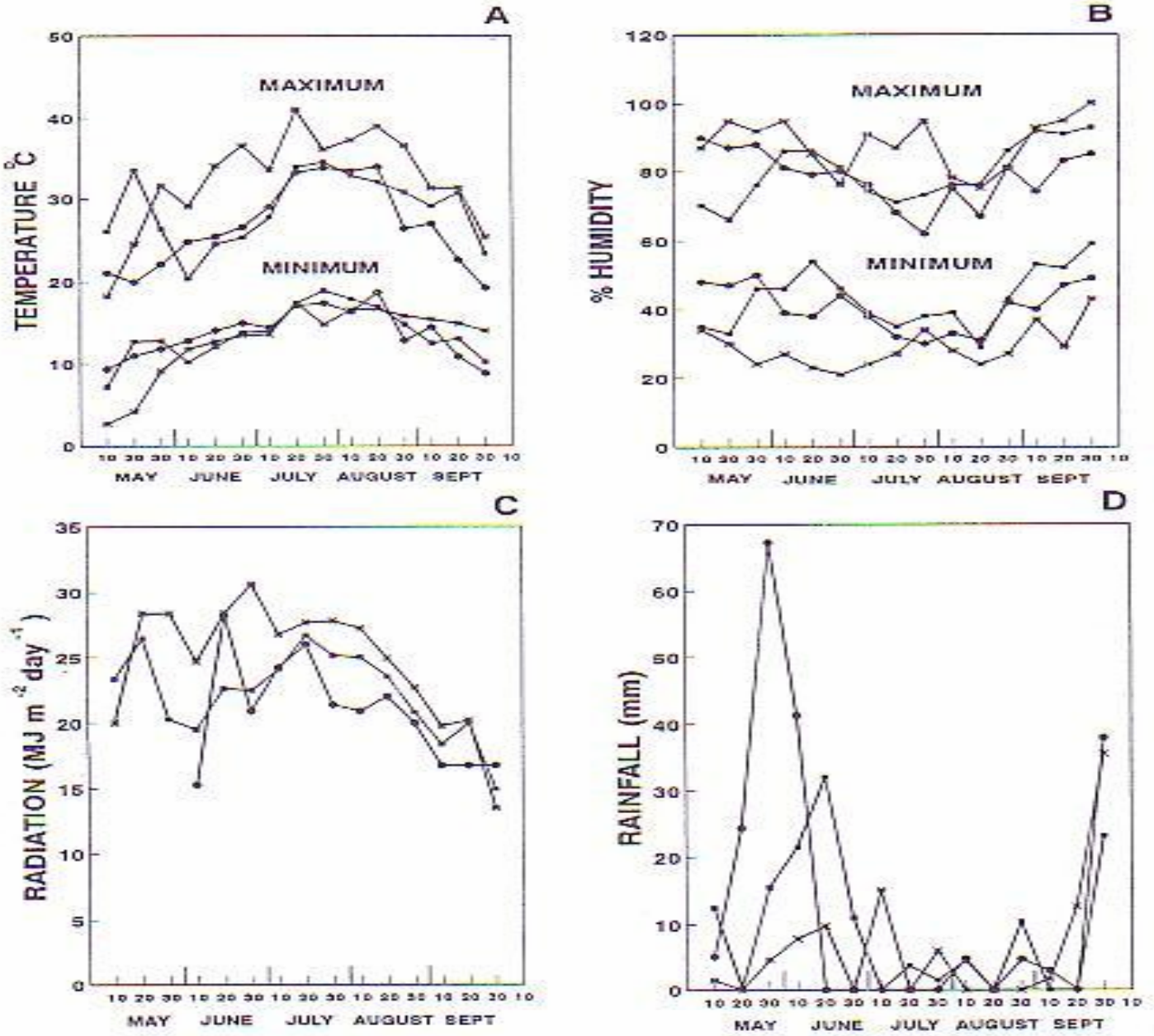


Fig. 1. Meteorological data for 1991 (✻), 1992 (■) and 1993 (●). (A) Maximum and minimum temperature, (B) maximum and minimum relative humidity, (C) total solar radiation, (D) rainfall.

“El Salvador” Stem Yield, with May June and July sowing times

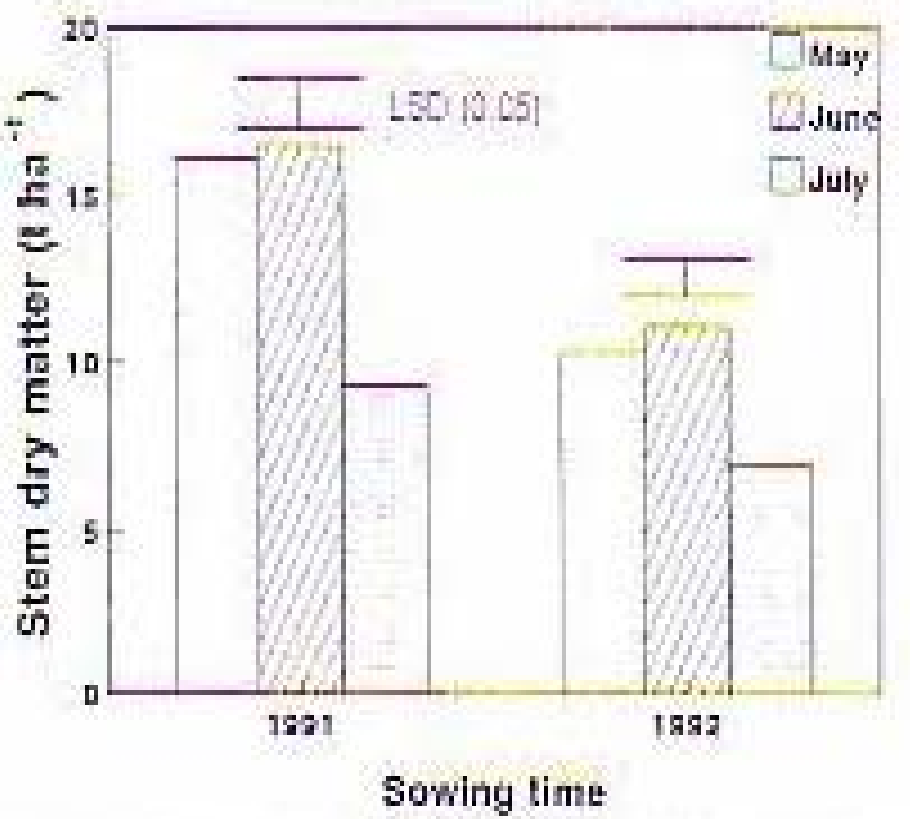


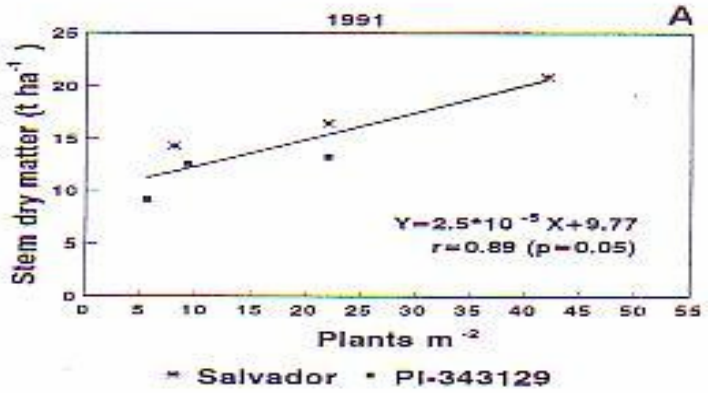
Fig. 2. Stem yields of El Salvador cultivar with an initial population of 30 000 plants ha^{-1} for different sowing times in 1991 and 1992.

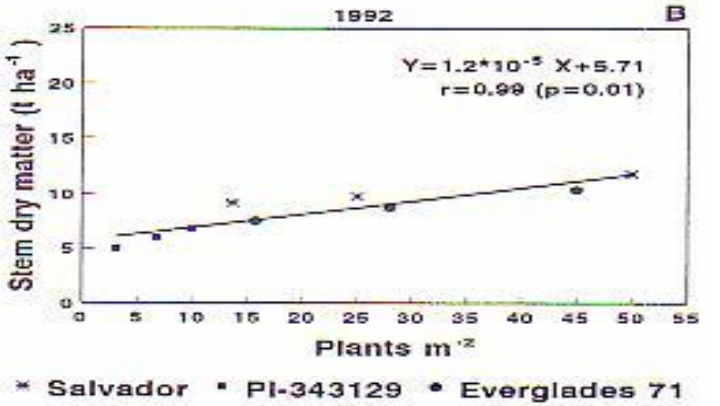
Kenaf sowing time

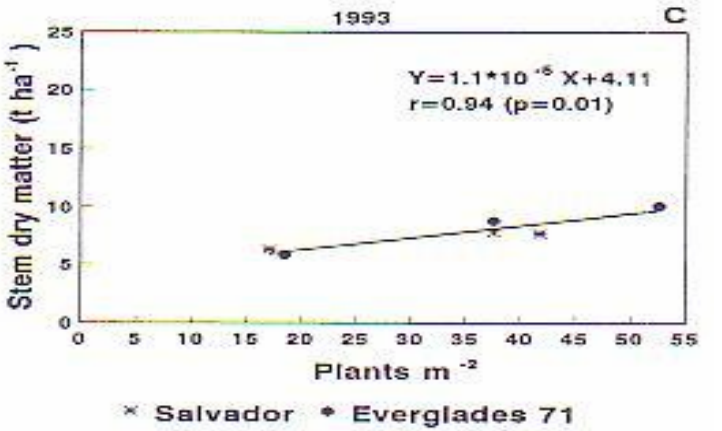
Table 2. Plant population, stem yield, height and basal diameter of El Salvador, Everglades 71 and PI-343129 cultivars in 1991, 1992 and 1993. Statistical significance refers, except for means at bottom of the table, to independent ANOVAs for each combination of cultivar year

	1991			1992				1993			
	Plant population (p m^{-2})	Yield (t ha^{-1})	Height (m)	Plant population (p m^{-2})	Yield (t ha^{-1})	Height (m)	Stem diameter (mm)	Plant population (p m^{-2})	Yield (t ha^{-1})	Height (m)	Stem diameter (mm)
El Salvador											
	8.0	14.3	2.25	13.6	8.5	1.50	1.70	17.1	5.7	1.27	1.73
	22.0	16.5	2.23	25.0	9.8	1.30	1.45	37.6	7.8	1.39	1.54
	42.0	20.9	1.96	50.0	11.8	1.33	1.32	41.8	7.7	1.33	1.44
LSD (0.05)	1.9	3.5	0.19	7.3	1.6	NS	0.30	4.9	NS	NS	0.17
PI-343129											
	5.5	9.1	2.13	3.1	5.0	2.02	2.46				
	9.2	12.6	2.05	6.7	6.0	1.92	1.56				
	22.0	13.3	2.28	9.9	6.8	2.16	2.15				
LSD (0.05)	2.7	2.0	0.21	1.6	NS	NS	0.45				
Everglades 71											
				15.7	7.5	1.25	1.63	18.5	5.8	1.36	1.77
				28.0	8.9	1.38	1.34	37.6	8.8	1.27	1.38
				45.0	10.4	1.40	1.29	52.6	10.1	1.30	1.28
LSD (0.05)				4.9	2.0	NS	0.28	4.0	1.8	NS	0.30
Means											
El Salvador	24.0	17.3	2.14	29.5	10.0	1.37	1.49	32.2	7.1	1.33	1.57
PI-343129	12.2	11.6	2.15	6.6	5.9	2.03	2.19	—	—	—	—
Everglades 71	—	—	—	29.6	8.9	1.35	1.42	36.2	8.0	1.37	1.48
LSD (0.05)		4.9	NS		1.2	0.13	0.22		NS	NS	NS

Regressions Plant Pop and Stem dry matter







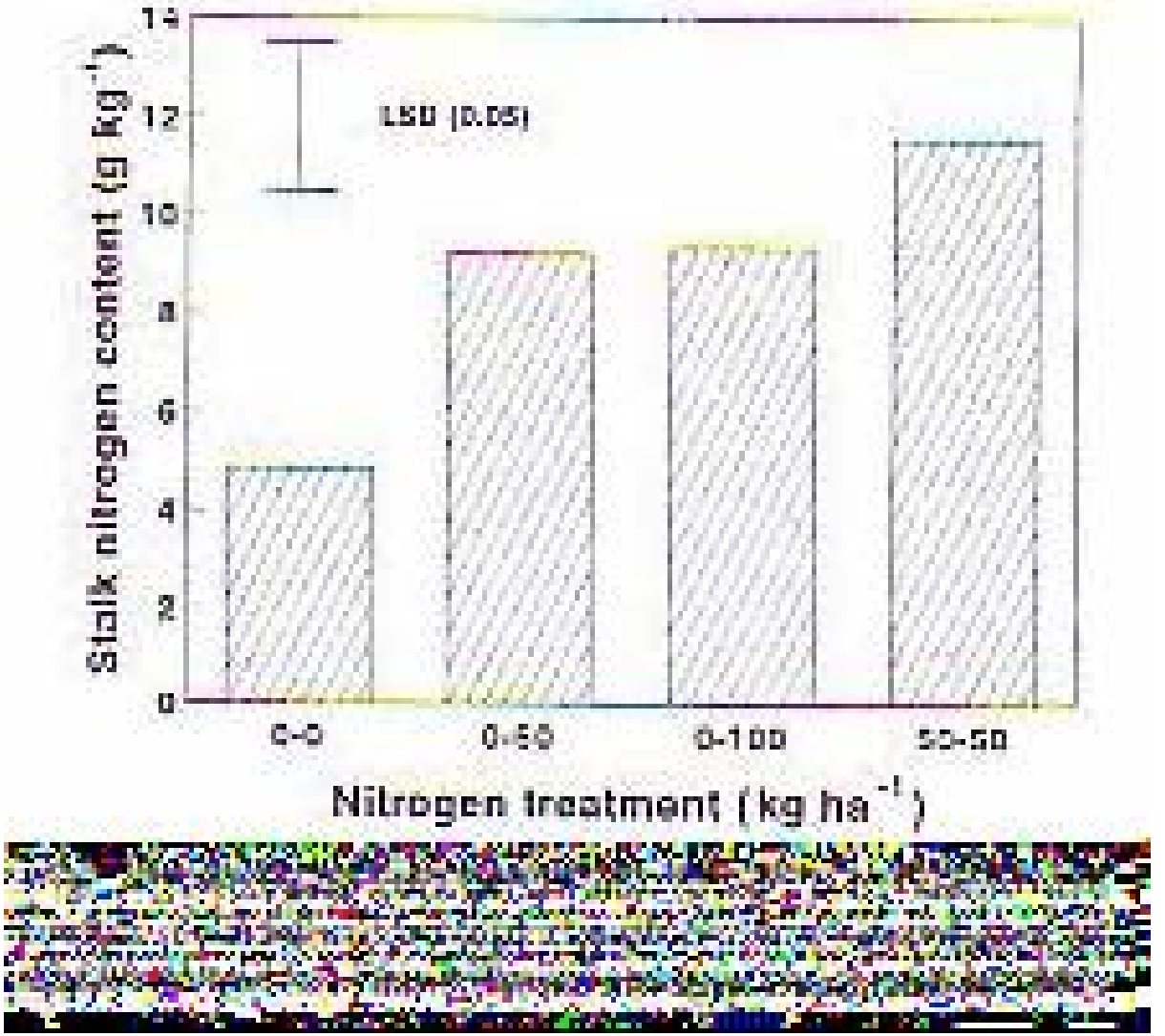
Nitrogen effect on plant population and yield

Table 3. Plant population and stem yield of El Salvador cultivar for different nitrogen treatments in 1991, 1992 and 1993. Statistical significance, except for means at the bottom of the table, refers to independent ANOVAs for each year.

Treatment Nitrogen rate (kg ha^{-1})		1991		1992		1993	
		Plant population (plant m^{-2})	Yield (t ha^{-1})	Plant population (plant m^{-2})	Yield (t ha^{-1})	Plant population (plant m^{-2})	Yield (t ha^{-1})
At planting	Top dressing						
0	0	23.0	14.5	37.0	13.5	36.4	11.3
0	50	27.0	18.2	40.0	14.7	36.9	10.0
0	100	24.0	18.9	37.0	13.8	34.5	9.6
50	0	23.0	16.0	35.4	11.6	—	—
50	50	25.0	18.2	35.7	15.9	37.6	7.8
50	100	20.0	17.0	25.0	10.0	—	—
LSD (0.05)				NS		2.7	2.4
Means*			Yield (t ha^{-1})				
1991			17.5				
1992			14.4				
1993			9.9				
LSD (0.05)			3.7				

*Means of treatments: 0–0; 0–50; 0–100; and 50–50.

N2 distribution between planting and top dressing



Initial and end N2 trial soil concentration for dressing treatments

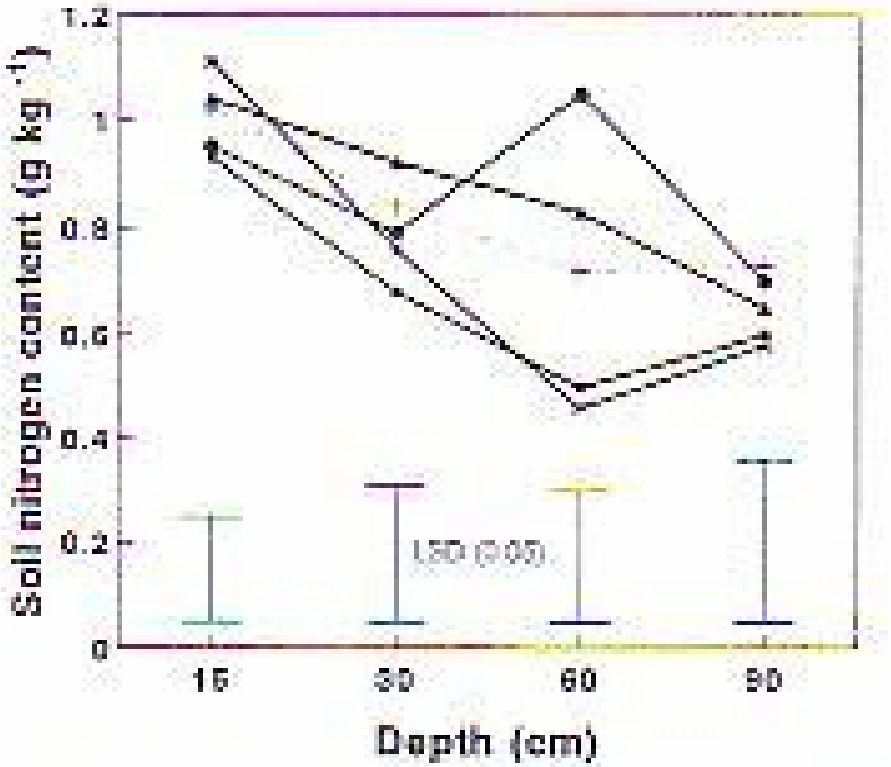
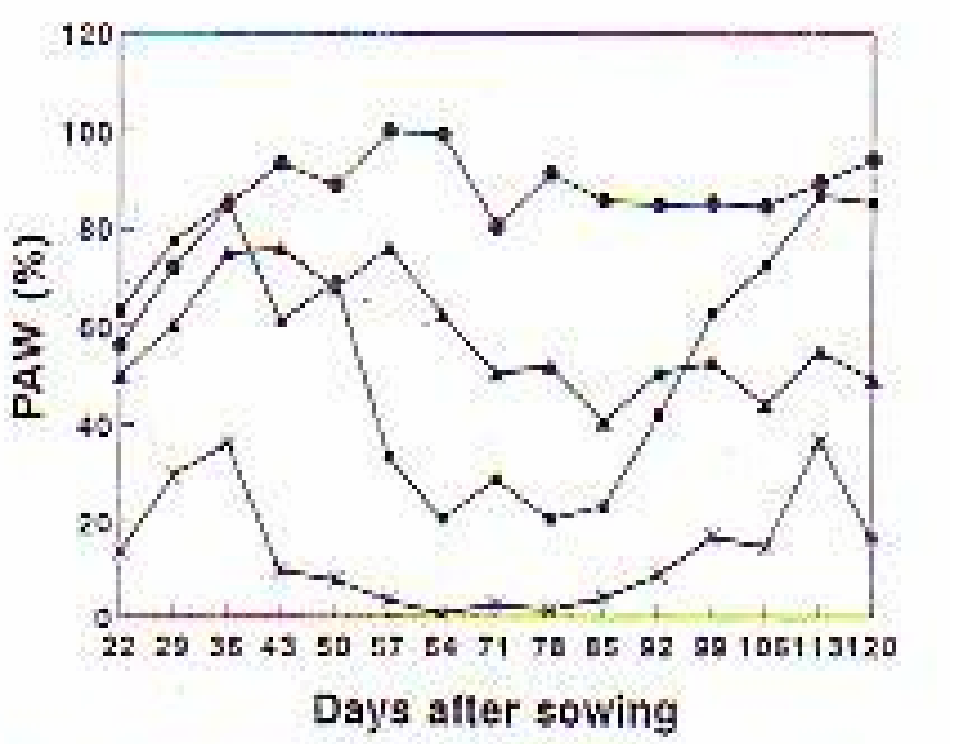


Fig. 5. Nitrogen concentrations (g kg^{-1}) in dry soil at 15, 30, 60 and 90 cm depth at the initial and end of the harvest time for different nitrogen treatments in 1993. Nitrogen treatment (kg ha^{-1}): +, Initial; *, 0–0; ■, 0–50; ▲, 0–100; ●, 50–50.

% of plant available water related to after sowing in 1993



* = 15 cm

■ = 30 cm

▲ = 60 cm

● = 90 cm