Yield and water productivity of cumin as influenced by irrigation techniques and land configuration

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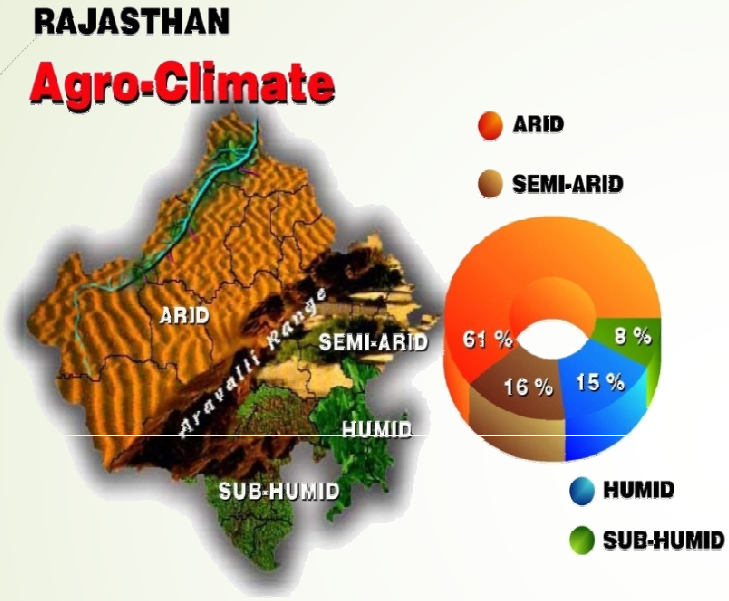
CUMIN

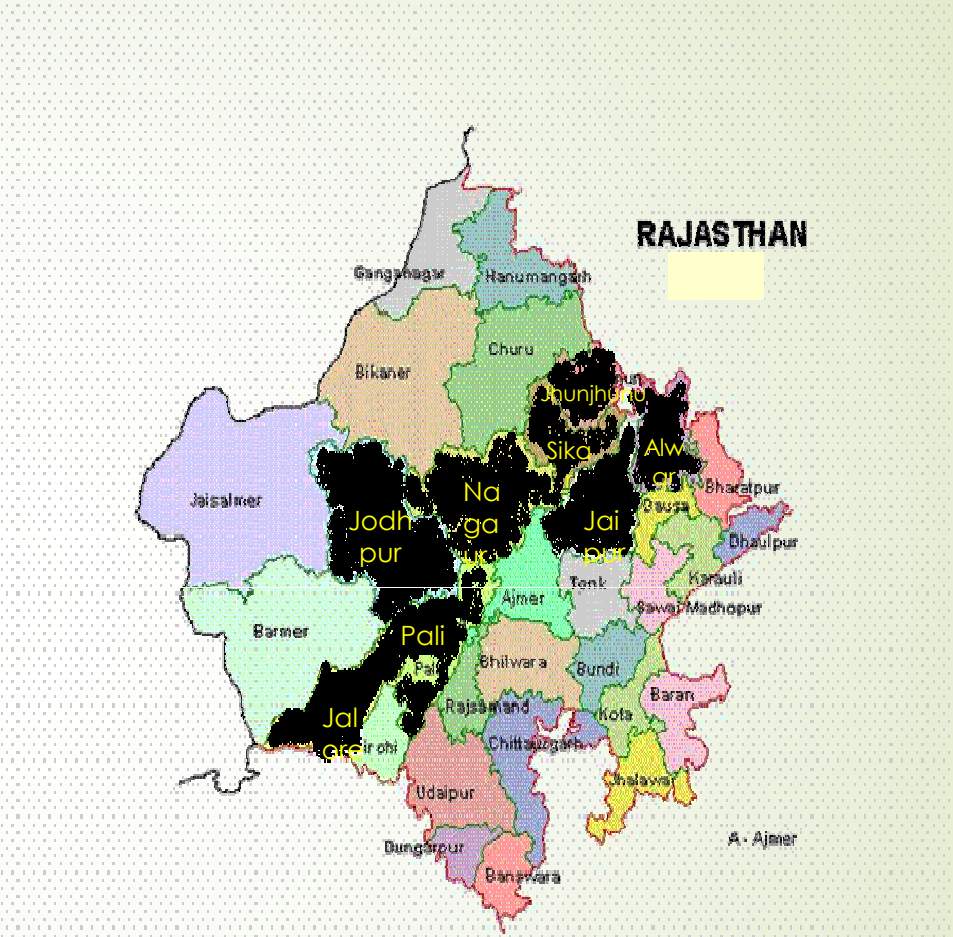
Cumin Plant

Cumin Seed

Climatic Requirement

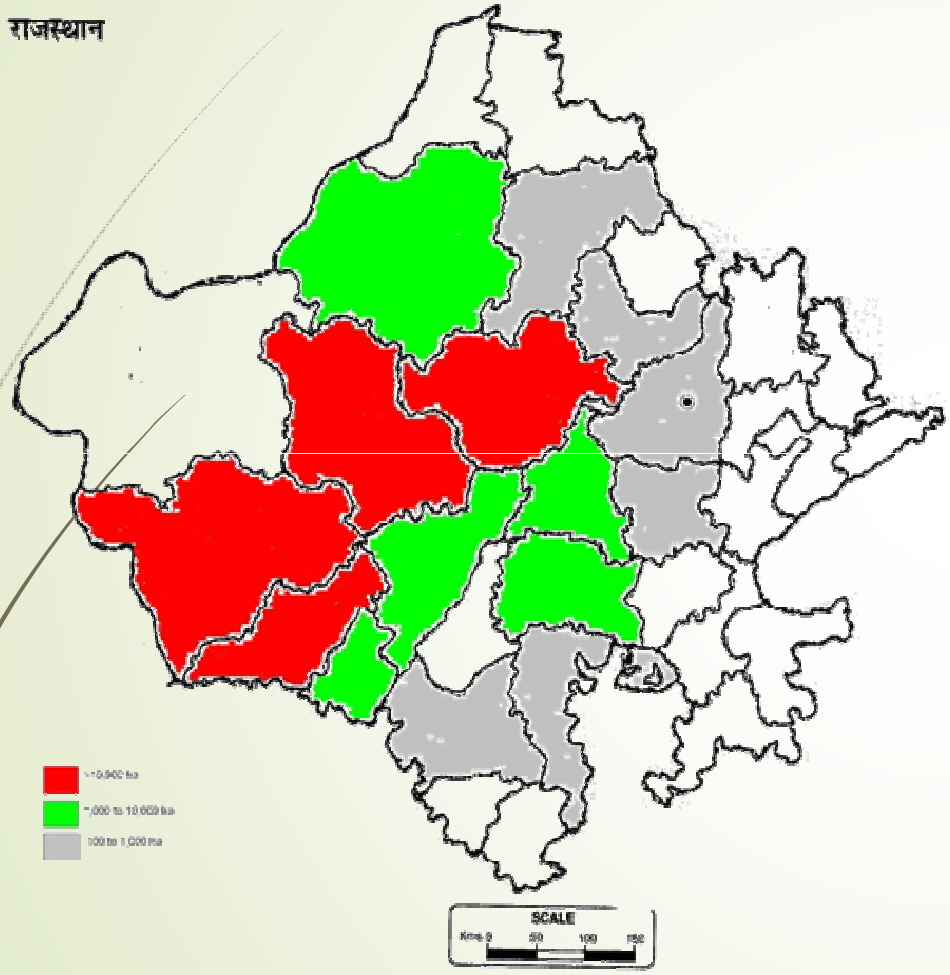
- **Moderately cool and dry climate.**
- **It does not prefer humidity in atmosphere during flowering**
- **Susceptible to frost injury during flowering and early fruit setting stage.**
- **Rain during flowering or early fruit setting and at the time of maturity period is highly undesirable.**
- **Cumin crop requires cool (15-25^0 C temperature) and dry climate for good growth and production.**
- **High humidity, cloudy weather, more dew and unseasonal rain after flowering of the crop are detrimental to cumin crop.**





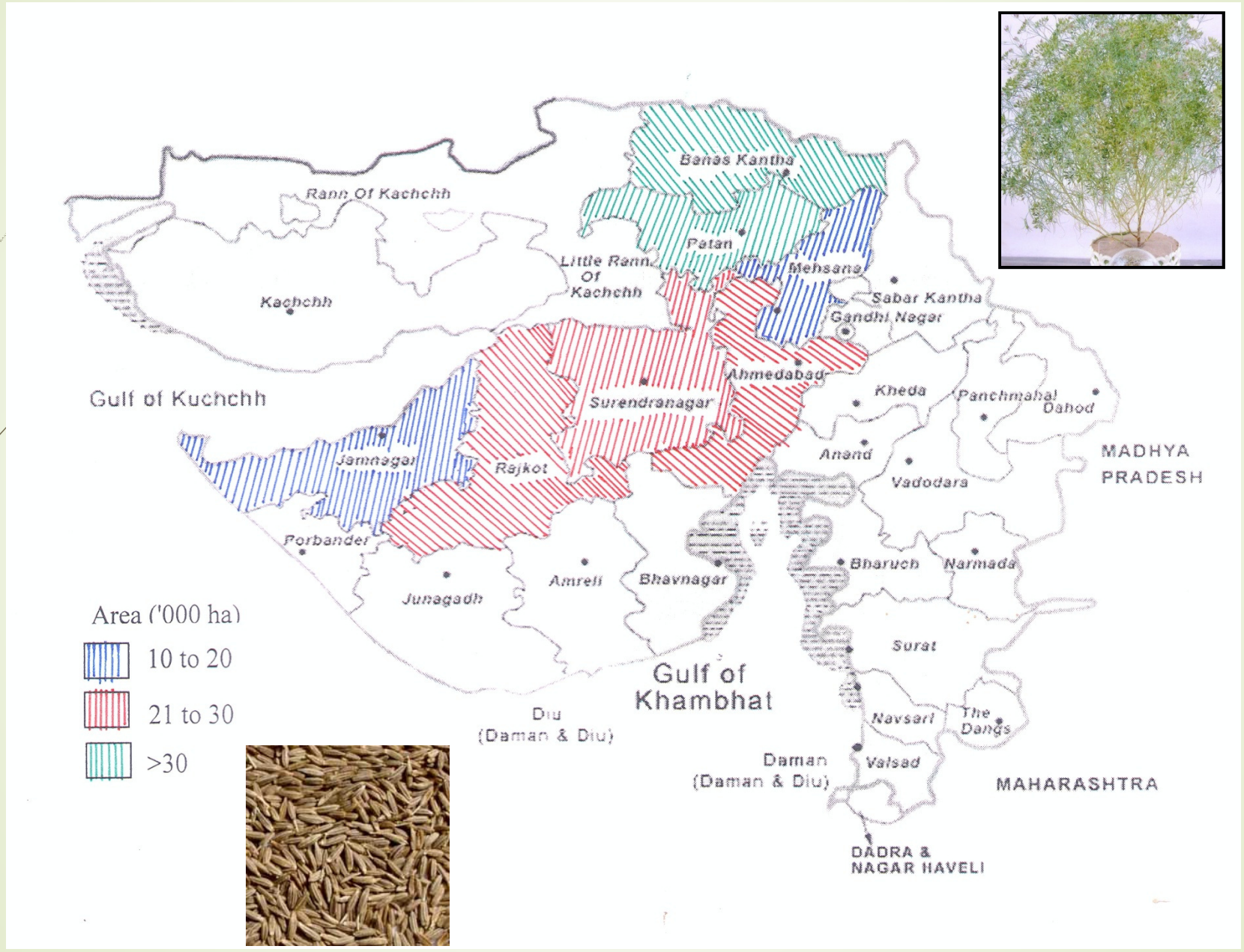
Most of the Seed Spices can't tolerate frost and therefore, Rajasthan offers an ideal climate for the cultivation of these crops

Cumin



Cumin is concentrated in the districts of Jodhpur, Jalore and Barmer contributing t 70% of the total area of the state

Major cumin growing districts of Gujarat



Objective:

- To find out the suitable planting and Irrigation methods for seed spices
- To work out the economics of seed spice production under different land configuration and irrigation systems under maize based cropping system
- To quantify the water productivity of seed spices

Treatments

Main Plot: Irrigation Methods (3)

a. Drip Irrigation
b. Flood Irrigation
c. Micro Sprinkler Irrigation

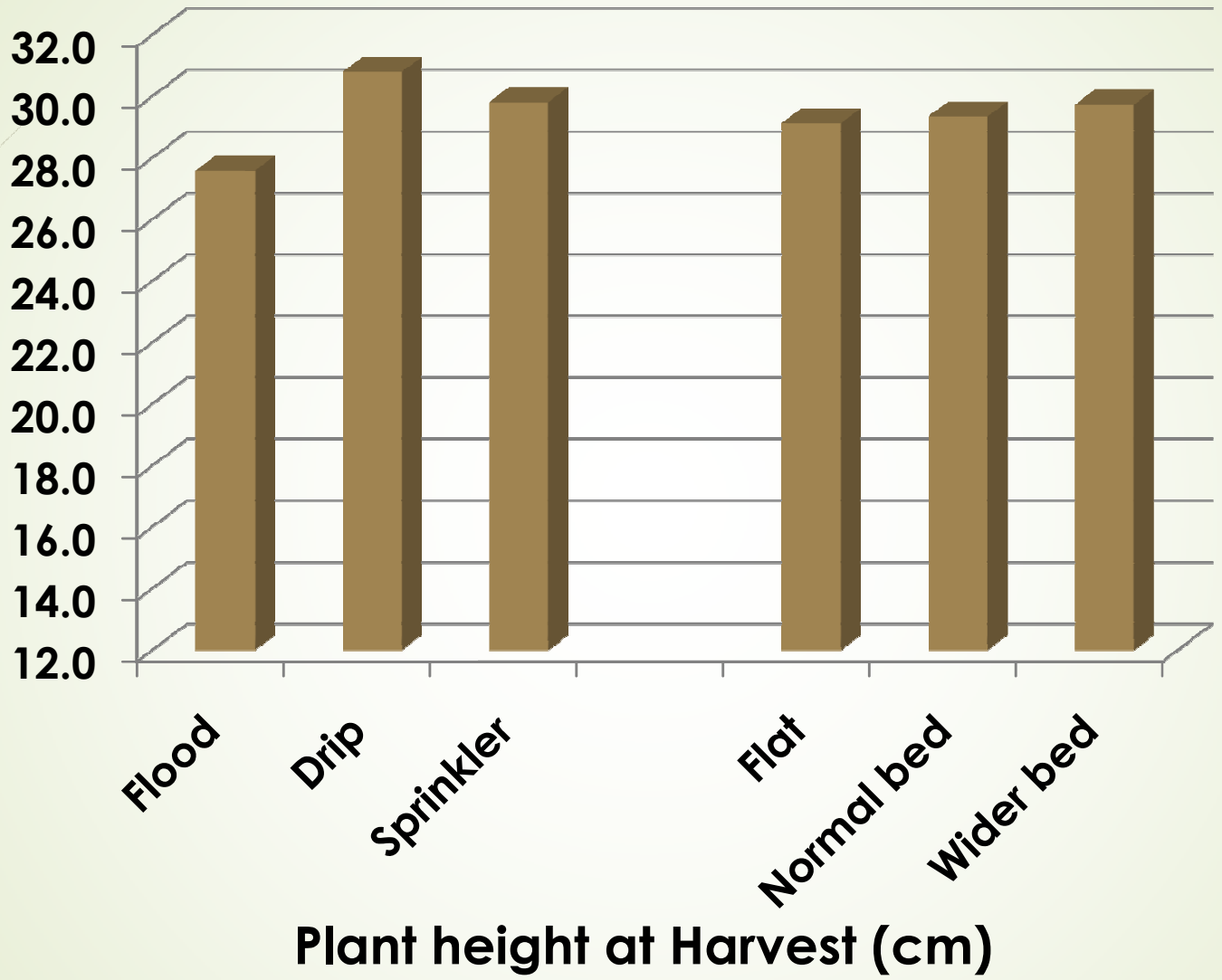
Sub Plot: Land Configuration (3)

a. Flat bed
b. FIRB (75 cm, Normal bed)
c. FIRB (150 cm, Wider bed)

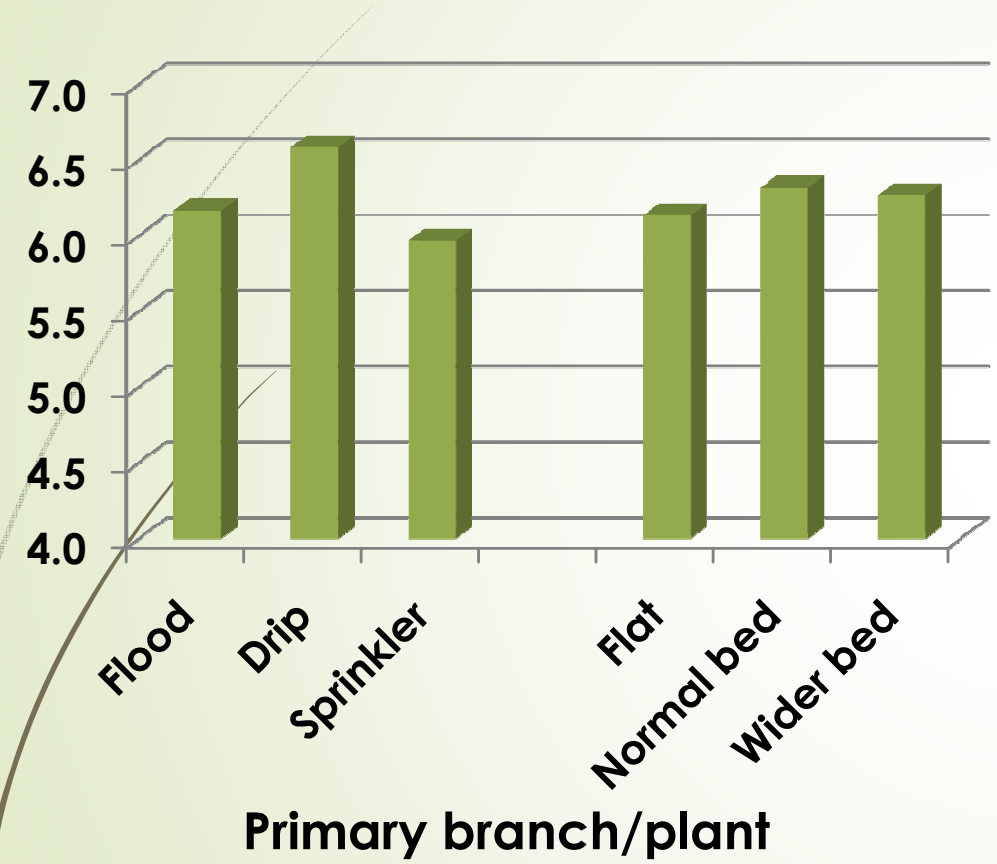
Number of Treatments: 09; Replication: 4 ;
Total Plots: 36; Design: Split Plot,
Plot size: 13.5 m^2
Varieties: GC-4 (Cumin),



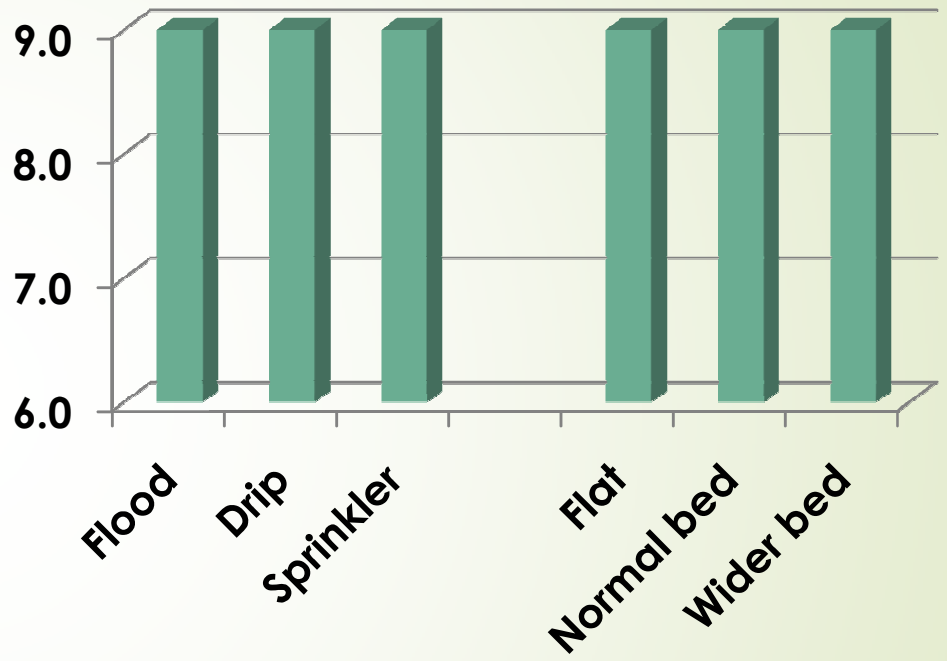

Treatment	Plant height at Harvest (cm)	Primary branch/ plant	Secondary branch/ plant	Umbel/ plant	umbellete /umbel	no of seeds/ umbellete	test weight (g)
Irrigation methods							
Flood	27.58	6.17	9.88	21.28	6.28	22.55	5.16
Drip	30.78	6.58	9.78	20.35	6.48	22.00	5.86
Sprinkler	29.80	5.97	9.20	19.83	6.20	22.52	5.22
CD at %	1.68	NS	NS	NS	NS	NS	NS
Land Configuration							
Flat	29.12	6.13	9.32	22.00	6.25	21.13	5.43
Normal bed	29.33	6.32	9.97	18.93	6.25	22.57	5.48
Wider bed	29.72	6.27	9.58	20.53	6.47	23.37	5.35
CD at %	NS	NS	NS	NS	NS	NS	NS



Plant height at Harvest (cm)

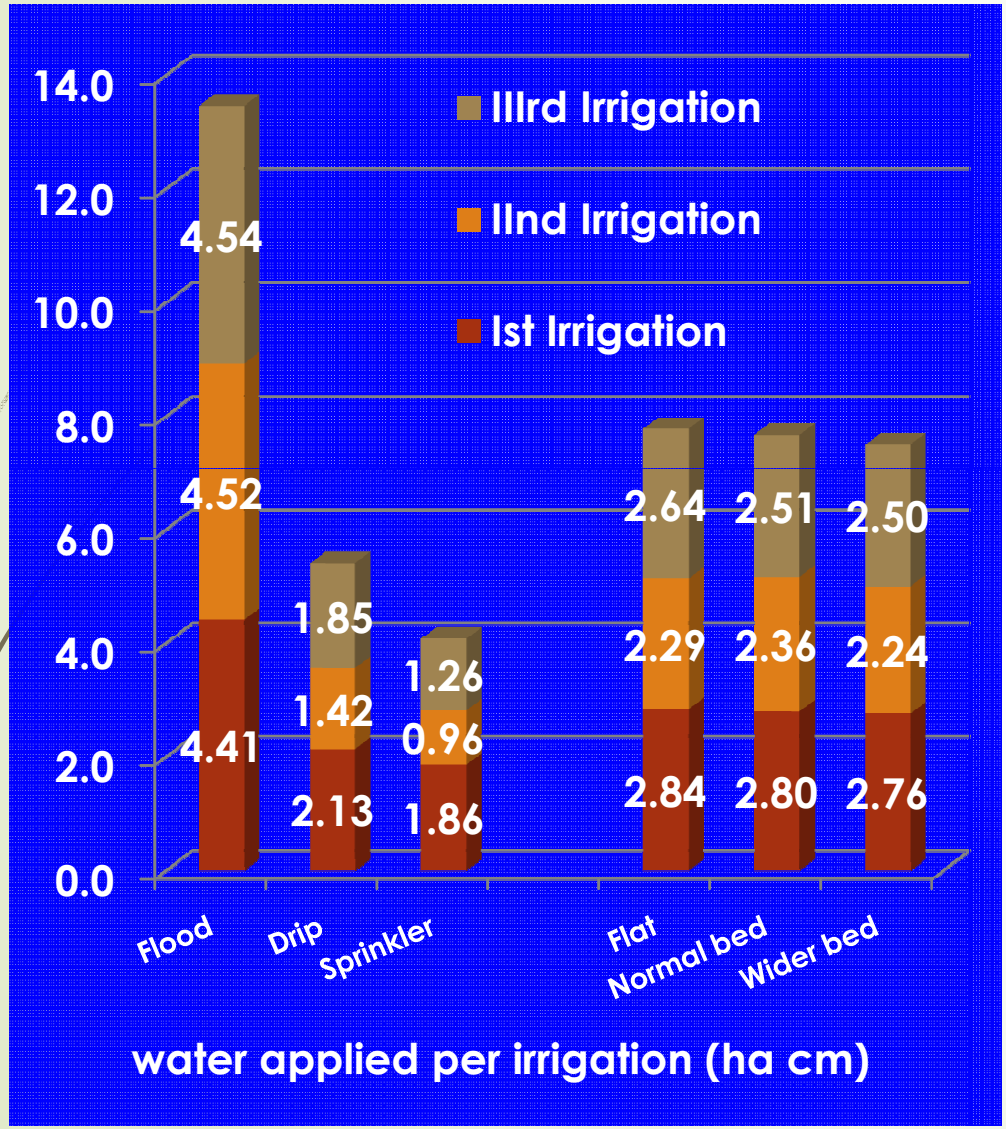


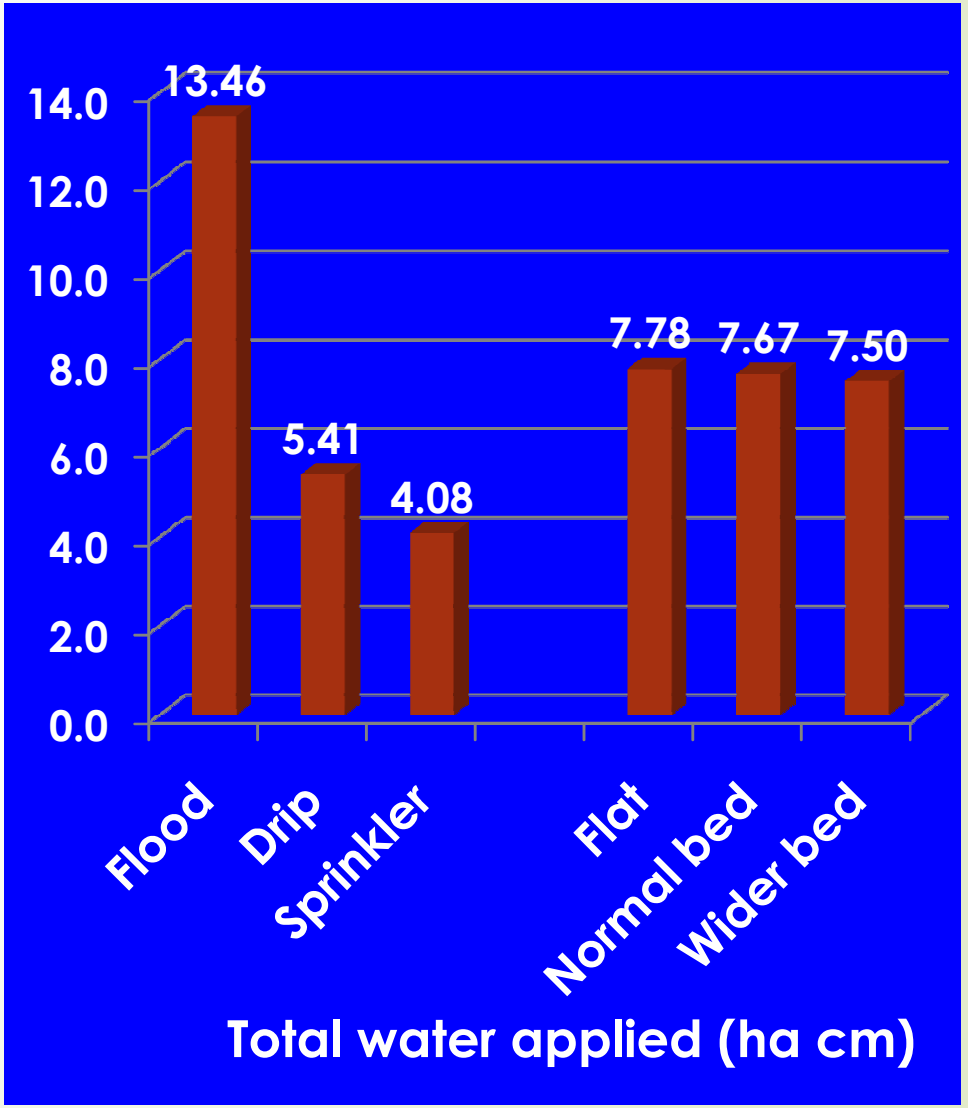
Primary branch/plant

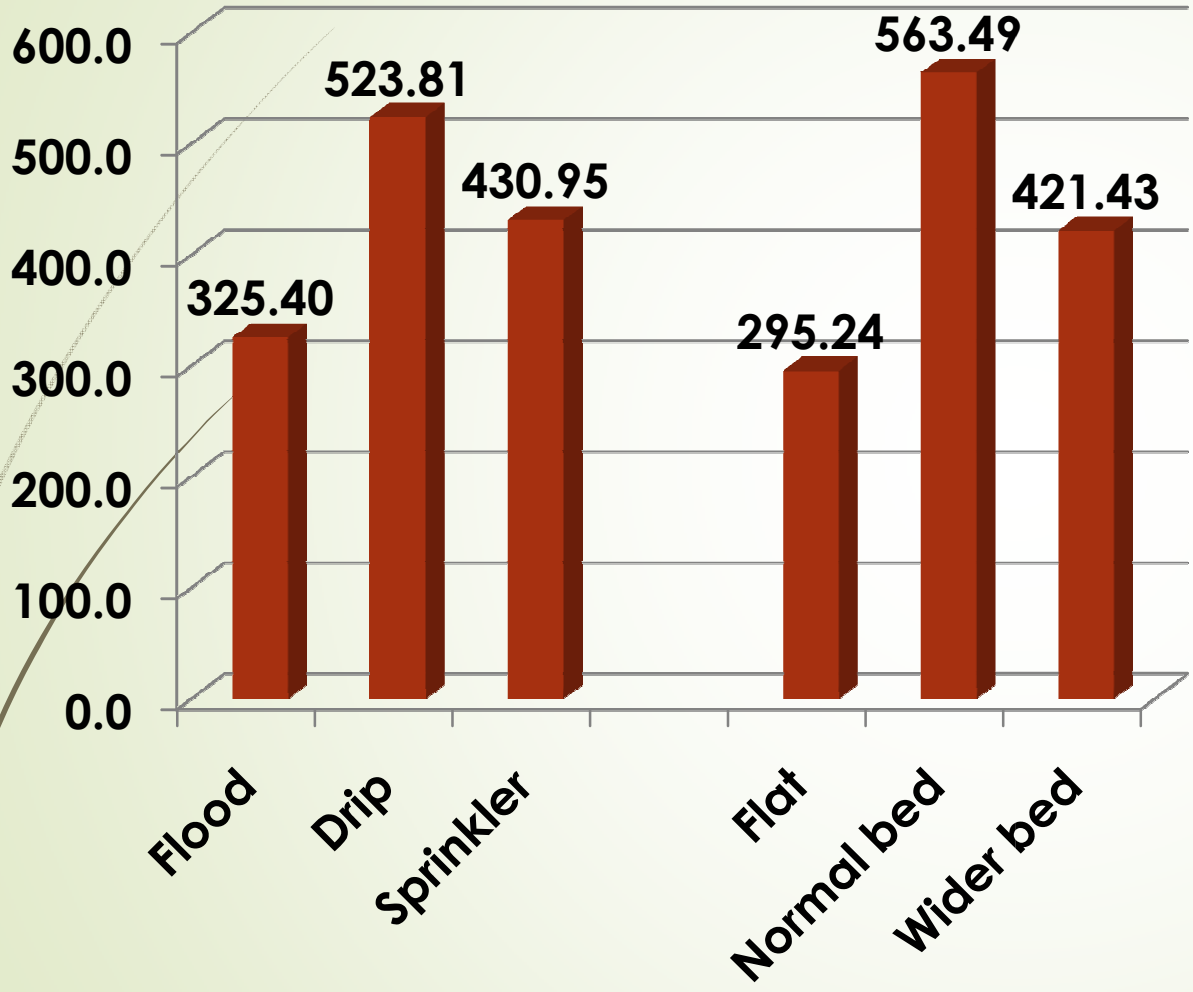


Secondary branch/plant

Irrigation water applied







Cumin Yield kg/ha

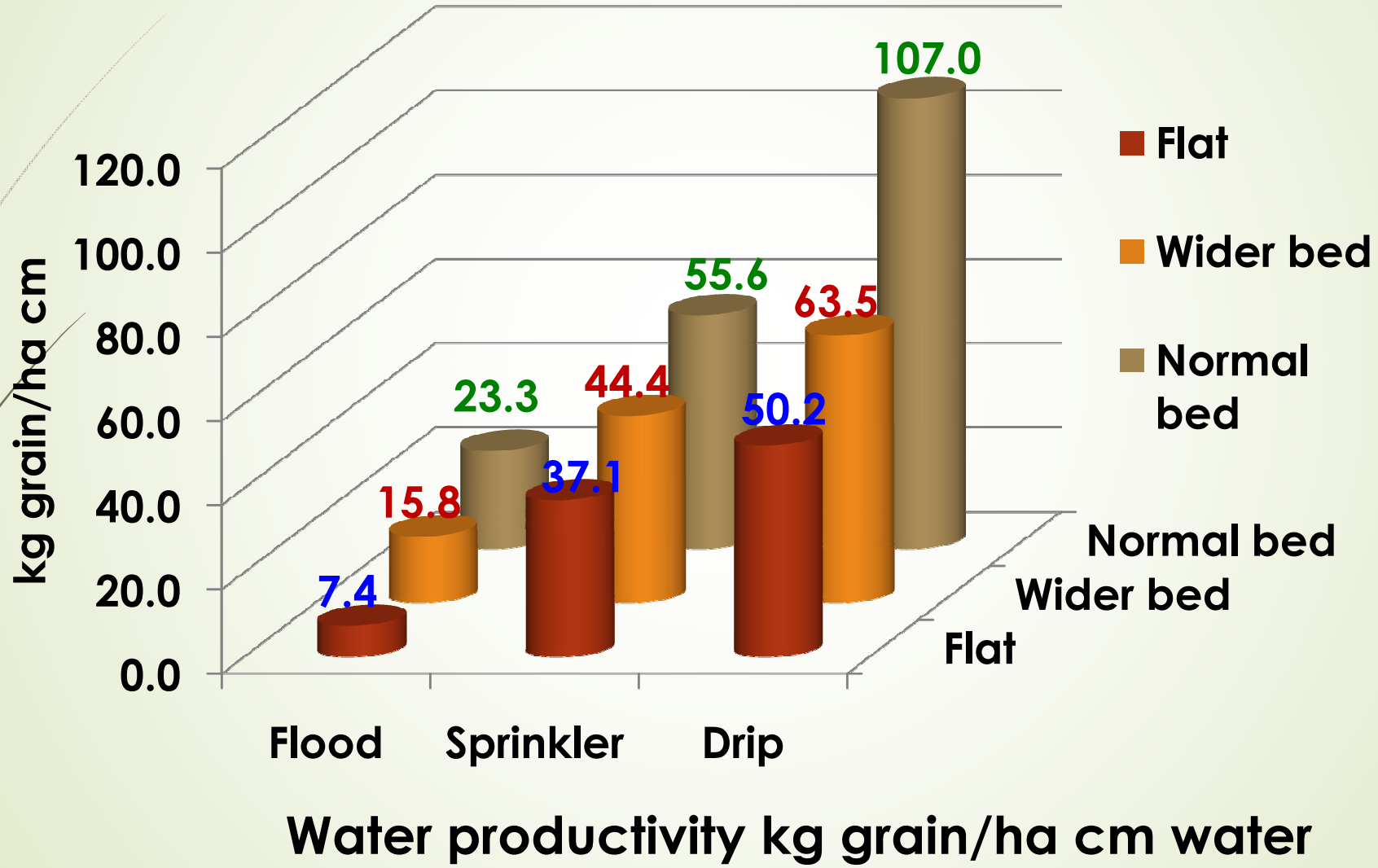
	B1	B2	B3	Mea
A1	178.6	404.8	392.9	32
A2	357.2	761.9	452.4	52
A3	350.0	523.8	419.0	43
Mean B	295.3	563.5	421.4	

Factors	C.D.	SE(d)	SE(r
Factor(A)	55.5	22.3	1
Factor(B)	35.0	16.5	1
Factor(B)at same level of A	65.8	28.6	2
Factor(A)at same level of B	74.1	0.0	

Grain Yield and water productivity of cumin as influenced by irrigation technique and land configuration

Treatment	Cumin Yield kg/ha	Total water applied (ha cm)	water productivity kg grain/ha cm irrigation water
Irrigation methods			
Flood	325.40	22.11	15.50
Drip	523.81	7.12	73.58
Sprinkler	430.95	9.43	45.70
CD at %	55.5	1.13	6.59
Land Configuration			
Flat	295.24	13.57	31.56
Normal bed	563.49	11.31	61.95
Wider bed	421.43	13.78	41.27
CD at %	35.0	0.55	4.07

Water productivity (cumin)



Salient findings:

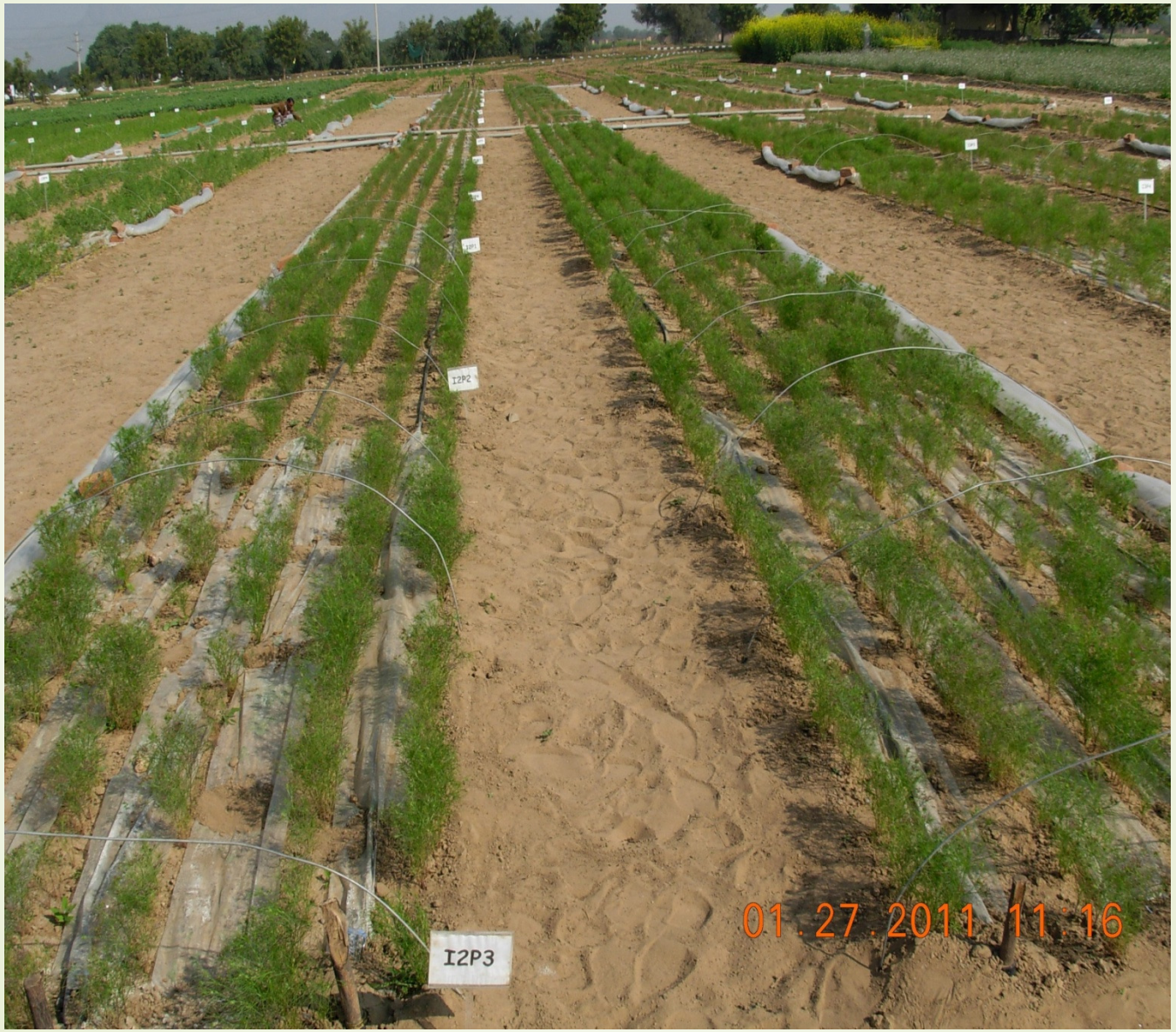
Cumin:

- Irrigation with drip and micro sprinkler not only enhanced the yield (523.8 and 430.9 kg/ha) than flood irrigation (325.4 kg/ha) but also gave higher water productivity 102.3 and 79.3 kg grain/ha cm irrigation water than flood irrigation methods (17.9 kg grain/ha cm).

- Among land configuration treatments, sowing of 3 rows of cumin on raised beds (75 cm) enhanced the grain yield by 268.2 and 142.0 kg/ha and water productivity by 42.8 and 28.5 kg grain/ha cm irrigation water than flat bed and wider raised beds (150 cm).

CUMIN Experiment

CUMIN: Flowering initiation



Effects of Irrigation methods and water conservation on Yield & Yield Attributes of CUMIN – Pooled Data

Treatment	Umbel/Pl	Umbellate/Pl	Seed Wt/Pl gm	Test Wt gm	Yield kg/ha
Irrigation Methods					
I1 flood	8.16	34.15	3.34	4.21	485.82
I2 Drip	9.26	37.38	3.73	4.36	533.68
I3 Low Pr Drip	9.68	39.08	4.25	4.68	607.52
S Em±	**0.22**	**0.90**	**0.12**	**0.08**	**8.61**
CD(0.05)	**0.73**	**2.34**	**0.38**	**0.25**	**28.06**
CV %	**12.07**	**9.52**	**15.00**	**8.35**	**7.77**

Irrigation water applied and water use efficiency

Treatment	Irrigation applied (mm)	Rainfall during crop season (mm)	Total water applied (mm)	Yield in kg/ha	Water u efficien (kg/ha/m
UMIN					
Flood	150	76	226	613.43	2.03
Drip	100	76	176	644.29	2.56
Low Pr drip	100	76	176	607.52	3.45

Future Thrust Areas for Cumin Production

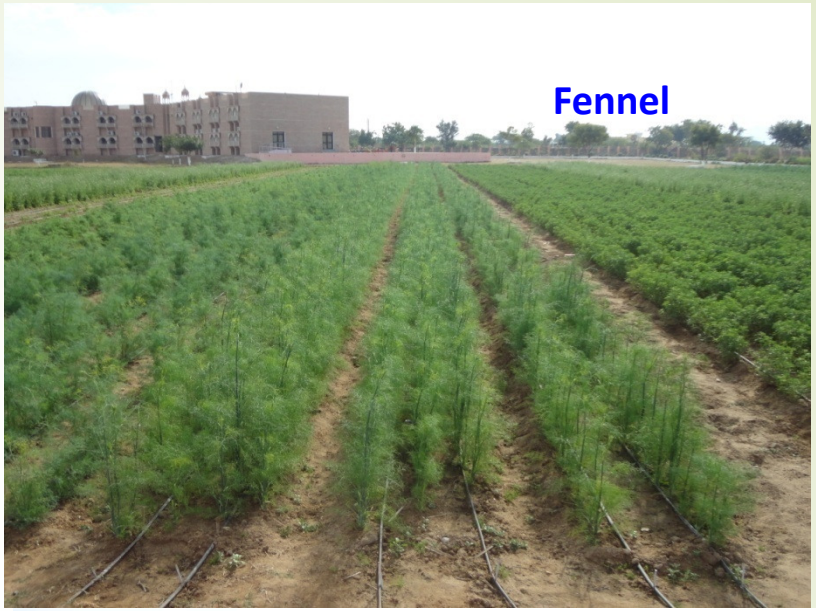
- Application of resource conserving technologies (RCTs) and conservation agriculture (CA) in seed spices
- Application of micro irrigation and fertigation technology in seed spices
- Application of protected cultivation technology
- Off season coriander cultivation under Shade net houses /Walk In Tunnels
- Insect proof net houses for safe seed spices cultivation
- Modern nursery raising technology for seed spices cultivation
- Mulching

Sowing by bed planter (FIRB 75 and 150 cm)

RAISED BEDS EQUIPPED WITH DRIP FERTIGATION

Drip installation and Irrigation

FIRB of 75 cm with Drip Fertigation



FIRB of 150 cm with Drip Fertigation


Thanks