

Soil Fertility
&
Soil Test Based Fertilizer Recommendations
For Sunflower and Castor
at
IIR Research farm - Narkhoda (Alfisols)
2021

ANNEXURE I

Soil Fertility of Narkoda farm – Plot wise (Alfisols) for 2021

PLOT	pH	E.C (dS/m)	O.C. (%)	N (kg/ha)	P (kg/ha)	K (kg/ha)	Av S (mg/kg)	Zn (ppm)	Fe (ppm)	Cu (ppm)	Mn (ppm)	Boron (ppm)
A-1	8.14	0.34	0.36	209	18	508	5.2	0.53	4.80	1.8	3.9	0.14
A-2	8.15	0.31	0.42	152	20	605	19.4	0.82	4.10	1.9	6.4	0.12
A-3	8.23	0.31	0.52	161	18	533	18.6	0.48	3.50	2.2	3.4	0.13
A-4	8.22	0.27	0.61	193	19	432	9.7	0.49	3.60	2	2.7	0.08
A-5	8.15	0.28	0.46	201	40	623	15.6	0.36	3.40	1.6	2.9	0.08
A-6	8.17	0.28	0.43	171	37	655	17.2	0.52	3.10	1.8	2	0.06
A-7	8.12	0.31	0.42	183	30	534	4.5	0.44	3.80	2.1	2.2	0.08
B-1	8.06	0.34	0.68	188	29	644	20.0	0.52	3.90	1.9	3.5	0.08
B-2	8.1	0.32	0.61	182	32	728	22.3	0.60	4.20	1.9	3.9	0.07
B-3	8.13	0.4	0.69	182	36	679	23.1	0.65	3.40	1.9	4.3	0.08
B-4	8.14	0.38	0.72	149	29	673	25.2	0.46	4.10	2.29	7.7	0.06
B-5	8.02	0.36	0.37	146	34	592	27.6	0.47	4.50	1.9	4.4	0.09
B-6	8.07	0.38	0.56	198	36	663	20.9	0.45	3.90	1.9	3.4	0.08
B-7	8.09	0.35	0.67	161	28	624	22.4	0.48	3.50	1.8	2.5	0.06
C-1	8.16	0.31	0.68	157	24	578	25.4	0.41	4.20	1.8	2.6	0.09
C-2	8.05	0.38	0.58	176	39	684	24.2	0.42	4.20	1.8	3.1	0.09
C-3	8.04	0.49	0.7	161	49	684	25.4	0.59	4.30	1.7	3.7	0.08
C-5	8.15	0.46	0.51	177	16	610	27.5	0.42	4.50	2.2	4.9	0.08
C-6	8.18	0.34	0.58	149	17	440	22.3	0.45	4.60	2.1	4.5	0.06
C-7	8.2	0.26	0.7	147	21	635	27.6	0.42	4.40	2.4	6.6	0.09

C-8	8.1	0.3	0.56	196	21	405	22.4	0.25	4.00	1.7	3.2	0.07
D-1	8.14	0.28	0.5	186	22	765	25.4	0.44	4.30	2.1	7.6	0.09
D-2	8.09	0.23	0.6	207	18	734	21.6	0.25	4.80	2.3	4.4	0.11
D-3	8.1	0.35	0.26	249	24	682	23.1	0.42	4.10	2.1	5.6	0.11
D-4	8.09	0.27	0.48	177	35	557	23.8	0.41	2.20	1.4	3	0.07
D-5	8.06	0.38	0.49	198	37	664	27.4	0.39	2.80	1.6	3.5	0.14
D-6	8.22	0.28	0.45	149	24	588	23.1	0.26	3.30	1.7	2.6	0.11
D-7	8.13	0.32	0.48	200	35	504	20.9	0.27	3.90	1.9	5.2	0.09
D-8	8.22	0.18	0.71	180	20	504	22.4	0.29	4.20	2.1	7.8	0.08
D-9	8.18	0.37	0.43	183	22	418	26.5	0.20	3.40	1.4	2.7	0.09
E-1A	8.11	0.26	0.43	146	14	279	18.6	0.31	3.00	0.9	3.2	0.11
E-1B	8.15	0.22	0.66	176	24	548	16.4	0.43	2.80	1.6	2.9	0.12
E-2A	7.05	0.45	0.69	164	32	784	23.1	0.81	4.50	0.6	10.3	0.12
E-2B	8	0.22	0.58	157	25	536	17.2	0.59	3.00	0.9	2.4	0.12
E-3	8.01	0.39	0.78	176	26	581	28.4	0.88	2.80	0.8	2.9	0.14
E-4	8.18	0.37	0.75	181	56	1316	26.4	0.90	3.90	1.8	6.3	0.10
E-5	8.11	0.34	0.69	195	35	1115	26.8	0.67	4.90	2.4	5.8	0.10
E-6	8.2	0.39	0.7	223	22	608	20.1	0.25	3.80	1.9	3.5	0.13
E-7	8.13	0.32	0.76	190	29	652	25.4	0.26	3.90	1.6	3.3	0.11
E-8	8.11	0.27	0.61	201	17	560	20.8	0.22	3.40	1.8	3.2	0.12
E-9	7.94	0.22	0.75	219	47	782	28.4	0.45	3.70	1.3	7.4	0.10
F-1	5.12	0.38	0.41	240	27	152	24.6	0.73	9.60	0.6	5.6	0.15
F-3	8.04	0.28	0.55	227	29	555	23.1	0.46	3.90	1.6	6.2	0.10
F-5	8.15	0.39	0.75	194	45	1503	23.1	0.66	3.30	1.4	3.6	0.10
F-6	8.06	0.36	0.69	189	43	730	28.6	0.46	4.70	1.6	2.9	0.17
G-1	8.2	0.29	0.59	171	26	613	22.4	0.28	3.50	1.5	4	0.08

G-2	8.12	0.22	0.52	206	28	737	17.2	0.22	3.90	1.9	6.2	0.09
G-3	7.36	0.23	0.57	215	37	466	23.1	1.70	2.50	0.5	6.5	0.11
G-4	7.85	0.29	0.53	200	30	618	23.1	0.52	2.60	1.2	3.4	0.16
G-5	8.13	0.23	0.62	170	20	491	16.4	0.67	3.20	1.6	3.2	0.08
G-6	8.11	0.26	0.55	168	25	734	8.9	0.52	4.20	1.5	5.2	0.11
G-7	8.16	0.23	0.5	184	18	564	17.2	0.34	5.20	1.9	5.5	0.01
G-8	8.09	0.37	0.77	171	31	669	16.4	0.48	3.90	1.6	4.8	0.08
G-9	8.1	0.25	0.59	145	35	591	28.9	0.24	3.80	1.4	5.5	0.08
G-10	8.15	0.25	0.68	164	22	463	9.7	0.12	4.30	1.6	2.9	0.12
G-11	8.13	0.3	0.73	166	18	499	14.2	0.29	4.70	1.8	4.7	0.11
G-12	8.17	0.16	0.66	186	13	701	14.2	0.39	5.00	2.2	6.9	0.12
H-1	8.14	0.26	0.56	176	13	504	9.7	0.17	3.70	1.3	5.2	0.08
H-2	7.62	0.25	0.56	203	21	489	11.9	0.49	3.20	1.1	4.1	0.11
H-3	7.31	0.27	0.74	225	21	396	12.7	0.82	2.20	0.5	3.9	0.13
H-4	7.45	0.25	0.75	240	29	570	18.6	0.89	2.90	0.7	4.5	0.15
H-5	7.44	0.24	0.76	238	32	177	20.8	0.67	2.10	0.5	4.9	0.13
H-6	8.1	0.28	0.72	186	22	447	17.9	0.18	3.80	1.3	2.9	0.16
H-7	8.03	0.34	0.73	179	34	776	17.9	0.20	3.20	1.3	3.6	0.12
H-8	8.13	0.29	0.73	184	26	535	17.2	0.23	3.40	1.2	3.1	0.12
H-9	8.12	0.33	0.7	169	26	553	17.2	0.43	2.10	1.5	3.1	0.14
H-10	8.12	0.29	0.66	162	23	413	18.6	0.49	3.40	1.2	3.1	0.13
H-11	8.12	0.26	0.71	216	15	422	19.4	0.25	4.30	1.6	6.1	0.11
I-1	8.13	0.19	0.74	235	12	570	15.6	0.20	3.90	1.5	5.2	0.12
I-3	8.17	0.17	0.71	215	17	751	12.7	0.26	3.90	1.4	7.6	0.11
I-4	8.26	0.17	0.77	229	17	626	11.2	0.17	3.80	1.5	4	0.16
I-5	8.13	0.23	0.69	240	17	484	11.9	0.34	3.90	1.4	2.9	0.12

I-6	8.17	0.18	0.53	192	17	559	7.5	0.29	4.30	1.1	3.3	0.11
I-7	8.25	0.15	0.52	177	17	395	8.9	0.28	3.80	1.3	2.6	0.10
I-8	8.14	0.22	0.43	159	14	469	11.9	0.27	4.40	1.4	3.5	0.18
I-9	8.13	0.23	0.55	192	17	389	8.9	0.29	4.40	1.5	3.2	0.17
I-10	8.26	0.15	0.64	189	12	411	8.9	0.28	4.10	1.5	2.6	0.16
J-1	8.11	0.25	0.46	150	9	450	12.7	0.16	4.90	2	2.9	0.12
J-2	8.09	0.31	0.6	155	9	659	8.9	0.13	4.80	1.9	2	0.13
J-3	8.15	0.32	0.6	172	8	543	18.6	0.18	4.10	1.8	2.6	0.13
J-4	8.13	0.33	0.57	161	11	555	20.1	0.12	4.40	1.9	5.2	0.13
J-5	8.1	0.37	0.51	145	15	476	23.1	0.20	5.60	1.4	6.1	0.12
J-6	8.16	0.24	0.48	144	15	418	8.9	0.28	5.60	2.5	5.6	0.15
J-7	8.09	0.21	0.43	139	11	412	21.6	0.22	6.00	1.9	5.6	0.14
J-8	5.35	0.11	0.57	204	11	356	20.1	0.20	4.40	1.8	3.7	0.14
K-1	8.01	0.12	0.45	150	18	521	25.6	0.28	4.30	1.8	3.7	0.13
K-2	7.95	0.32	0.59	151	28	539	27.8	0.26	4.60	1.7	5.9	0.14
K-3	8.04	0.35	0.45	160	14	572	22.4	0.18	5.30	1.8	7.9	0.14
K-4	8.1	0.26	0.53	162	22	709	24.6	0.21	5.90	2	6.4	0.17
K-5	8.15	0.22	0.77	155	17	631	15.7	0.17	6.20	2.7	6.5	0.17
K-6	8.17	0.24	0.45	156	15	459	23.1	0.22	5.60	2.4	5.4	0.14
K-7	8.05	0.25	0.46	162	21	397	28.6	0.13	5.60	1.7	6.2	0.17
K-10	6.09	0.23	0.54	181	11	617	25.4	0.4	3.2	1.1	3.2	0.15
L-1	8.04	0.39	0.54	182	16	529	28.6	0.20	4.60	1.8	4.5	0.17
L-2	8.09	0.39	0.53	160	10	511	20.1	0.11	5.30	2.2	5.1	0.12
L-3	8.08	0.29	0.61	180	13	545	28.4	0.11	4.20	1.6	4.8	0.08
L-4	8.1	0.29	0.65	168	17	532	20.8	0.15	5.20	1.9	6.7	0.08
L-5	8.05	0.24	0.54	178	11	395	20.1	0.33	4.40	1.8	5.5	0.03

L-6	8.24	0.17	0.47	116	8	467	17.2	0.10	7.80	2.1	11.4	0.08
L-7	8	0.39	0.61	144	6	478	23.1	0.16	5.80	1.9	7.9	0.08
M-1	8.19	0.18	0.6	119	10	468	16.4	0.10	5.20	1.8	6	0.06
M-2	8.11	0.25	0.53	155	14	492	18.6	0.17	5.10	1.5	5.1	0.07
M-3	8.07	0.24	0.65	157	12	616	18.6	0.18	5.80	2	8.1	0.07
N-1	7.33	0.23	0.61	138	12	592	23.8	0.50	3.90	0.7	10.6	0.06
N-2	7.04	0.26	0.59	196	14	673	14.9	0.58	5.40	1	8.8	0.07
N-3	7.07	0.21	0.64	211	8	675	11.2	0.35	3.10	0.6	8.9	0.07
N-4	6.12	0.19	0.39	218	4	420	13.4	0.10	4.20	0.5	14.5	0.05

Fertility rating values for OC, N, P, K is indicated 3 colours: Red= Low; Blue= medium; Green= high
Fertility rating Values for S & Micronutrients is indicated with 2 colours: Red= deficient; Green= sufficient

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ANNEXURE II

Soil test based fertilizer recommendations for Sunflower and Castor crops for Narkhoda farm soils (Alfisols) for 2021

STCR Equation for <u>Sunflower</u> Alfisols - Target 15q/ha	STCR Equation for <u>Castor</u> Alfisols - Target 20q/ha
$F N = 11.44 \times T - 0.41 \times \text{Soil N}$	$F N = 8.35 \times T - 0.40 \text{ SN}$
$F P_2O_5 = 7.49 \times T - 2.10 \times \text{Soil P}$	$F P_2O_5 = 7.17 \times T - 2.88 \text{ SP}$
$F K_2O = 3.80 \times T - 0.10 \times \text{Soil K}$	$F K_2O = 3.02 T - 0.10 \text{ SK}$
Where, FN = Fertilizer N required/ha; T = Target yield in q/ha; Soil N = Value of Soil N kg/ha F P2O5 = Fertilizer P required/ha; T = Target yield in q/ha; Soil P = Value of soil P kg/ha F K2O = Fertilizer K required/ha; T = Target yield in q/ha; Soil K = Value of soil K kg/ha	

Plot-wise fertilizer requirement as per the STCR recommendation for the target yield

Block/ Plot No	Sunflower (15q/ha target)			Castor (20q/ha target)		
	Soil test target yield based recommended N:P2O5:K2O kg/ha			Soil test target yield based recommended N:P2O5:K2O kg/ha		
	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O
A-1	86	75	6	83	92	10
A-2	109	70	-4	106	86	0
A-3	106	75	4	103	92	7
A-4	92	72	14	90	89	17
A-5	89	28	-5	87	28	-2
A-6	101	35	-9	99	37	-5
A-7	97	49	4	94	57	7
B-1	95	51	-7	92	60	-4
B-2	97	45	-16	94	51	-12
B-3	97	37	-11	94	40	-8
B-4	111	51	-10	107	60	-7
B-5	112	41	-2	109	45	1
B-6	90	37	-9	88	40	-6
B-7	106	54	-5	103	63	-2
C-1	107	62	-1	104	74	3
C-2	99	30	-11	97	31	-8
C-3	106	9	-11	103	2	-8
C-5	99	79	-4	96	97	-1
C-6	111	77	13	107	94	16
C-7	111	68	-7	108	83	-3
C-8	91	68	17	89	83	20
D-1	95	66	-20	93	80	-16
D-2	87	75	-16	84	92	-13
D-3	70	62	-11	67	74	-8
D-4	99	39	1	96	43	5
D-5	90	35	-9	88	37	-6
D-6	111	62	-2	107	74	2
D-7	90	39	7	87	43	10
D-8	98	70	7	95	86	10
D-9	97	66	15	94	80	19
E-1A	112	83	29	109	103	33

E-1B	99	62	2	97	74	6
E-2A	104	45	-21	101	51	-18
E-2B	107	60	3	104	71	7
E-3	99	58	-1	97	69	2
E-4	97	-5	-75	95	-18	-71
E-5	92	39	-55	89	43	-51
E-6	80	66	-4	78	80	0
E-7	94	51	-8	91	60	-5
E-8	89	77	1	87	94	4
E-9	82	14	-21	79	8	-18
F-1	73	56	42	71	66	45
F-3	79	51	2	76	60	5
F-5	92	18	-93	89	14	-90
F-6	94	22	-16	91	20	-13
G-1	101	58	-4	99	69	-1
G-2	87	54	-17	85	63	-13
G-3	83	35	10	81	37	14
G-4	90	49	-5	87	57	-1
G-5	102	70	8	99	86	11
G-6	103	60	-16	100	71	-13
G-7	96	75	1	93	92	4
G-8	101	47	-10	99	54	-7
G-9	112	39	-2	109	43	1
G-10	104	66	11	101	80	14
G-11	104	75	7	101	92	11
G-12	95	85	-13	93	106	-10
H-1	99	85	7	97	106	10
H-2	88	68	8	86	83	12
H-3	79	68	17	77	83	21
H-4	73	51	0	71	60	3
H-5	74	45	39	72	51	43
H-6	95	66	12	93	80	16
H-7	98	41	-21	95	45	-17
H-8	96	58	4	93	69	7
H-9	102	58	2	99	69	5
H-10	105	64	16	102	77	19
H-11	83	81	15	81	100	18
I-1	75	87	0	73	109	3
I-3	83	77	-18	81	94	-15
I-4	78	77	-6	75	94	-2
I-5	73	77	9	71	94	12
I-6	93	77	1	90	94	4
I-7	99	77	18	96	94	21
I-8	106	83	10	103	103	14
I-9	93	77	18	90	94	22
I-10	94	87	16	91	109	19
J-1	110	93	12	107	117	15
J-2	108	93	-9	105	117	-6
J-3	101	96	3	98	120	6
J-4	106	89	2	103	112	5

J-5	112	81	9	109	100	13
J-6	113	81	15	109	100	19
J-7	115	89	16	111	112	19
J-8	88	89	21	85	112	25
K-1	110	75	5	107	92	8
K-2	110	54	3	107	63	6
K-3	106	83	0	103	103	3
K-4	105	66	-14	102	80	-11
K-5	108	77	-6	105	94	-3
K-6	108	81	11	105	100	15
K-7	105	68	17	102	83	21
K-10	97	89	-5	95	112	-1
L-1	97	79	4	94	97	7
L-2	106	91	6	103	115	9
L-3	98	85	3	95	106	6
L-4	103	77	4	100	94	7
L-5	99	89	18	96	112	21
L-6	124	96	10	121	120	14
L-7	113	100	9	109	126	13
M-1	123	91	10	119	115	14
M-2	108	83	8	105	103	11
M-3	107	87	-5	104	109	-1
N-1	115	87	-2	112	109	1
N-2	91	83	-10	89	103	-7
N-3	85	96	-11	83	120	-7
N-4	82	104	15	80	132	18

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ANNEXURE III

Soil test based fertilizer recommendations (*Modified*) for Sunflower and Castor crops in Narkoda farm (Alfisols) for 2021

Block/ Plot No	Sunflower (15q/ha target)			Castor (20q/ha target)		
	Soil test target yield based recommended N:P2O5:K2O kg/ha			Soil test target yield based recommended N:P2O5:K2O kg/ha		
	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O
A-1	86	75	20	83	92	20
A-2	109	70	20	106	86	20
A-3	106	75	20	103	92	20
A-4	92	72	20	90	89	20
A-5	89	28	20	87	28	20
A-6	101	35	20	99	37	20
A-7	97	49	20	94	57	20
B-1	95	51	20	92	60	20
B-2	97	45	20	94	51	20
B-3	97	37	20	94	40	20
B-4	111	51	20	107	60	20
B-5	112	41	20	109	45	20
B-6	90	37	20	88	40	20
B-7	106	54	20	103	63	20
C-1	107	62	20	104	74	20
C-2	99	30	20	97	31	20
C-3	106	9	20	103	2	20
C-5	99	79	20	96	97	20
C-6	111	77	20	107	94	20
C-7	111	68	20	108	83	20
C-8	91	68	20	89	83	20
D-1	95	66	20	93	80	20
D-2	87	75	20	84	92	20
D-3	70	62	20	67	74	20
D-4	99	39	20	96	43	20
D-5	90	35	20	88	37	20
D-6	111	62	20	107	74	20
D-7	90	39	20	87	43	20
D-8	98	70	20	95	86	20
D-9	97	66	20	94	80	20
E-1A	112	83	20	109	103	20
E-1B	99	62	20	97	74	20
E-2A	104	45	20	101	51	20
E-2B	107	60	20	104	71	20
E-3	99	58	20	97	69	20
E-4	97	-5	20	95	-18	20
E-5	92	39	20	89	43	20
E-6	80	66	20	78	80	20
E-7	94	51	20	91	60	20
E-8	89	77	20	87	94	20
E-9	82	14	20	79	8	20

F-1	73	56	20	71	66	20
F-3	79	51	20	76	60	20
F-5	92	18	20	89	14	20
F-6	94	22	20	91	20	20
G-1	101	58	20	99	69	20
G-2	87	54	20	85	63	20
G-3	83	35	20	81	37	20
G-4	90	49	20	87	57	20
G-5	102	70	20	99	86	20
G-6	103	60	20	100	71	20
G-7	96	75	20	93	92	20
G-8	101	47	20	99	54	20
G-9	112	39	20	109	43	20
G-10	104	66	20	101	80	20
G-11	104	75	20	101	92	20
G-12	95	85	20	93	106	20
H-1	99	85	20	97	106	20
H-2	88	68	20	86	83	20
H-3	79	68	20	77	83	20
H-4	73	51	20	71	60	20
H-5	74	45	20	72	51	20
H-6	95	66	20	93	80	20
H-7	98	41	20	95	45	20
H-8	96	58	20	93	69	20
H-9	102	58	20	99	69	20
H-10	105	64	20	102	77	20
H-11	83	81	20	81	100	20
I-1	75	87	20	73	109	20
I-3	83	77	20	81	94	20
I-4	78	77	20	75	94	20
I-5	73	77	20	71	94	20
I-6	93	77	20	90	94	20
I-7	99	77	20	96	94	20
I-8	106	83	20	103	103	20
I-9	93	77	20	90	94	20
I-10	94	87	20	91	109	20
J-1	110	93	20	107	117	20
J-2	108	93	20	105	117	20
J-3	101	96	20	98	120	20
J-4	106	89	20	103	112	20
J-5	112	81	20	109	100	20
J-6	113	81	20	109	100	20
J-7	115	89	20	111	112	20
J-8	88	89	20	85	112	20
K-1	110	75	20	107	92	20
K-2	110	54	20	107	63	20
K-3	106	83	20	103	103	20
K-4	105	66	20	102	80	20
K-5	108	77	20	105	94	20
K-6	108	81	20	105	100	20

K-7	105	68	20	102	83	20
K-10	97	89	20	95	112	20
L-1	97	79	20	94	97	20
L-2	106	91	20	103	115	20
L-3	98	85	20	95	106	20
L-4	103	77	20	100	94	20
L-5	99	89	20	96	112	20
L-6	124	96	20	121	120	20
L-7	113	100	20	109	126	20
M-1	123	91	20	119	115	20
M-2	108	83	20	105	103	20
M-3	107	87	20	104	109	20
N-1	115	87	20	112	109	20
N-2	91	83	20	89	103	20
N-3	85	96	20	83	120	20
N-4	82	104	20	80	132	20

STCR Equation for <u>Sunflower</u> Alfisols - Target 15q/ha	STCR Equation for <u>Castor</u> Alfisols - Target 15q/ha
$F N = 11.44 \times T - 0.41 \times S N$	$F N = 8.35 \times T - 0.40 \times S N$
$F P_2O_5 = 7.49 \times T - 2.10 \times S P$	$F P_2O_5 = 7.17 \times T - 2.88 \times S P$
$F K_2O = 3.80 \times T - 0.10 \times S K$	$F K_2O = 3.02 T - 0.10 \times S K$
Where, FN = Fertilizer N required/ha; T = Target yield in q/ha; Soil N = Value of Soil N kg/ha F P2O5 = Fertilizer P required/ha; T = Target yield in q/ha; Soil P = Value of soil P kg/ha F K2O = Fertilizer K required/ha; T = Target yield in q/ha; Soil K = Value of soil K kg/ha	

NOTE

- The soil test values of Narkhoda farm show a high status of available P and K (Annexure I).
- After fitting STCR equation for the target yield (Annexure II), the plots requiring <15kg P₂O₅/ha, a uniform dose of 20kg P₂O₅/ha is suggested as maintainer dose for providing priming effect for PSB (Annexure III). **Suggested to follow Annexure III.**
- A uniform dose PSB @ 1 kg /ac is suggested to be used as furrow or spot application along with seed at sowing. PSB can also be used as seed dressing.
- Soil K was high in general and a uniform maintainer dose of 20kg K₂O/ha is suggested.
- Though Sulphur status is not currently estimated, based on earlier reports of wide spread S deficiency in the region, it is desirable to apply S @ 30kg/ha for increasing yield and oil content. Elemental S (GROMOR 90% S) is available in the farm section.
- Along with soil test based balanced nutrient management, clean cultivation, split application of N, applying N in moist soil and covering with soil, spot application of P are better practices for achieving higher nutrient use efficiency.
- **Since soils are deficient in boron, soil based or foliar application may be followed for B loving crops**