

**DETERMINATION OF THE COST
EFFECTIVE APPLICATION RATE
OF SULFUR AMENDMENT ON
CROPS**



Project Objectives

The main objective of this study is to determine the most cost effective application rate of the sulfur amendment for the growth enhancement of selected vegetable crops

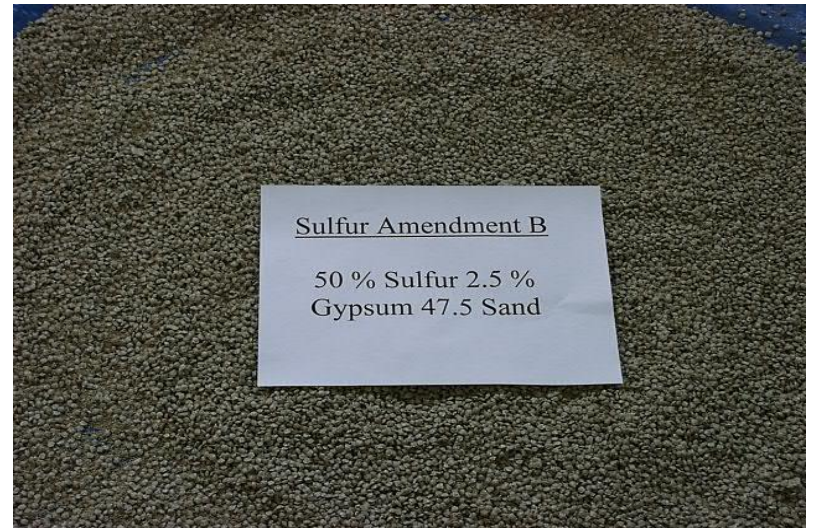
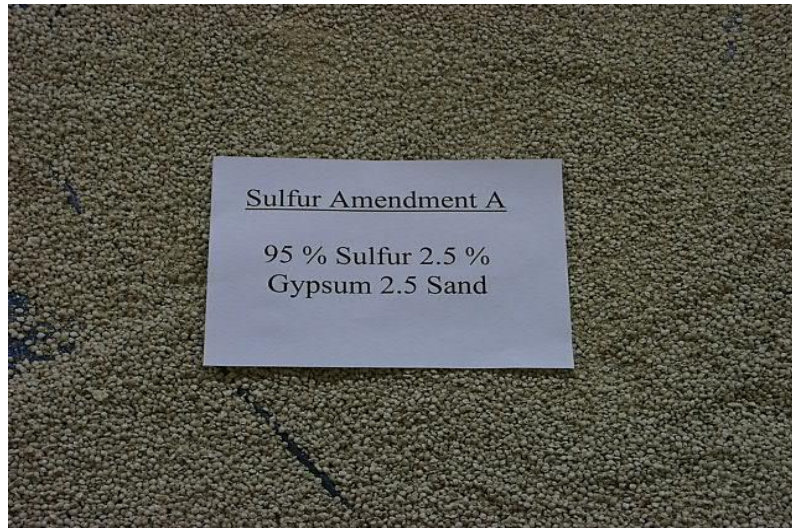
Experimental design

- 1. Two sulfur amendments :**
 - 50 % Sulfur + 2.5 % Gypsum + 47.5 Sand.**
 - 95 % Sulfur + 2.5 % Gypsum + 2.5 Sand.**
- 2. Four different application rates of sulfur amendment with control:**
 - 50gm, 25gm, 15gm, 10gm and 0**
- 3. Crop tested:**
 - Tomato, Cucumber, Yellow Pepper and Red Pepper**
- 4. The experiment has been conducted in triplicate.**

Sulfur Amendment Pellets Preparations



Sulfur Amendment Types



Plantations of the Selected Plants in the Experimental Pots



The four different application rates of sulfur amendment

- 1) 50 g S-Amendment / pot = 800kg/Donum
- 2) 25 g S-Amendment / pot = 400kg/Donum
- 3) 15 g S-Amendment / pot = 240kg/Donum
- 4) 10 g S-Amendment / pot = 160kg/Donum

Cucumber in the greenhouse



Tomato in the greenhouse



Yellow pepper in the greenhouse



Red pepper in the greenhouse



Soil Analysis:

- **Soil pH**
- **Soil Moisture**
- **Mineral and Heavy Metal**

Plant Monitoring parameters

- **Plant Height**
- **Chlorophyll Index**
- **Sugar Profile of Fruits**
- **Total Nitrogen (Organic and Inorganic)**
- **Mineral and Heavy Metal Contents in Plant**
- **Overall Visual Assessment of Plant Growth**



Result and Discussion

Plant Height of Tomato

Sample No.	Sample	After Tow Months	After Three Months	After Four Months
1	50g SA, 50% S	150	204	238
2	25g SA, 50% S	148	208	230
3	15g SA, 50% S	138	207	241
4	10g SA, 50% S	146	205	227
5	50g SA, 95% S	156	201	222
6	25g SA, 95% S	158	219	235
7	15g SA, 95% S	140	201	246
8	10g SA, 95% S	142	207	237
9	Control	148	195	225

Sugar Profile of Tomato

Sample No.	Sample	Sugars			
		Fructose %	Glucose %	Sucrose %	Total Sugar %
1	50g SA, 50% S	23	16	1.11	40
2	25g SA, 50% S	22	14	1.32	36
3	15g SA, 50% S	24	22	0.21	46
4	10g SA, 50% S	23	22	0.3	45
5	50g SA, 95% S	22	21	0.39	43
6	25g SA, 95% S	21	15	0.15	36
7	15g SA, 95% S	24	17	1.74	43
8	10g SA, 95% S	25	19	0.2	44
9	Control	25	25	1.82	52

Total Yield of Tomato

Sample No.	Sample	Total Yield	
		Fruit #	Wt. (gm)
1	50g SA, 50% S	5.0	215
2	25g SA, 50% S	3.0	209
3	15g SA, 50% S	4.0	241
4	10g SA, 50% S	8.0	368
5	50g SA, 95% S	11.0	202
6	25g SA, 95% S	9.0	405
7	15g SA, 95% S	9.0	494
8	10g SA, 95% S	4.0	483
9	Control	3.0	153

Tomato plants under different sulfur amendment treatments



Plant Height of Cucumber

Sample No.	Sample	After One Month	After Tow Months	After Three Months
1	50g SA, 50% S	133	234	228
2	25g SA, 50% S	130	225	228
3	15g SA, 50% S	151	230	230
4	10g SA, 50% S	145	235	247
5	50g SA, 95% S	127	224	228
6	25g SA, 95% S	149	232	235
7	15g SA,95% S	133	251	249
8	10g SA, 95% S	157	238	238
9	Control	147	216	222

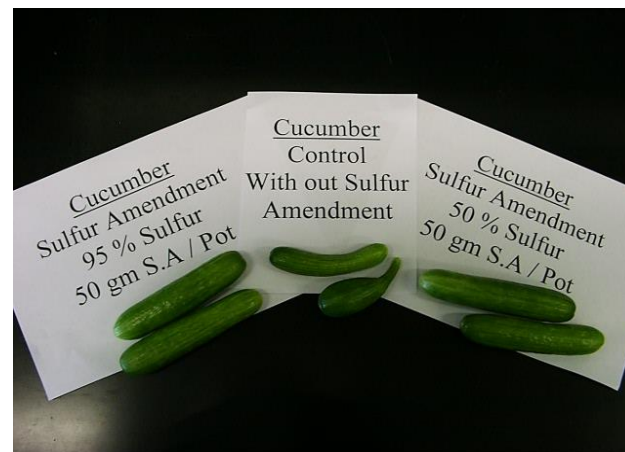
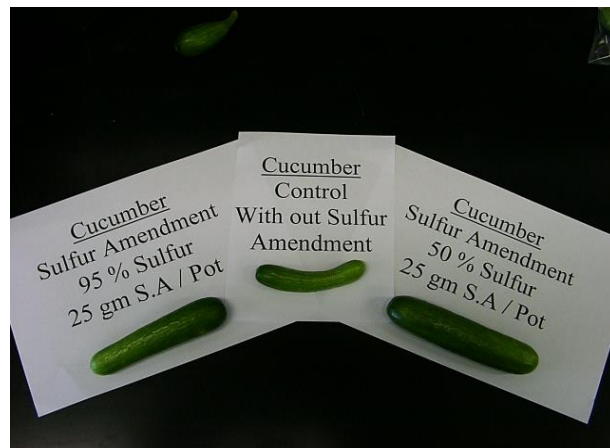
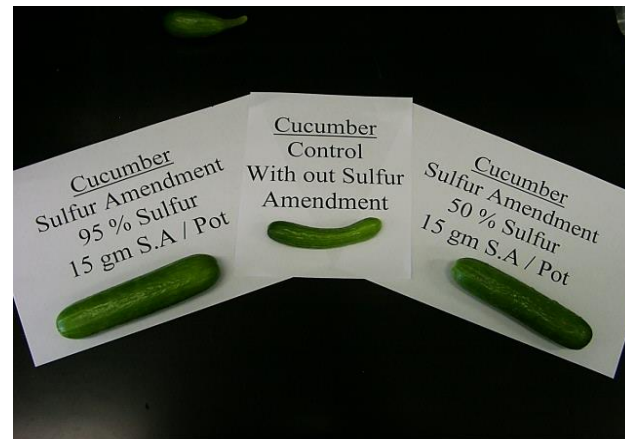
Sugar Profile of Cucumber

Sample No.	Sample	Sugars			
		Fructose %	Glucose %	Sucrose %	Total Sugar %
1	50g SA, 50% S	23	28	0.6	52
2	25g SA, 50% S	23	29	0.2	52
3	15g SA, 50% S	21	24	1.7	46
4	10g SA, 50% S	16	18	0.4	34
5	50g SA, 95% S	25	25	0.2	50
6	25g SA, 95% S	19	21	0.7	40
7	15g SA,95% S	28	26	0.2	54
8	10g SA, 95% S	26	27	2.9	56
9	Control	25	30	0.2	55

Total Yield of Cucumber

Sample No.	Sample	Total Yield	
		Fruit #	Wt. (gm)
1	50g SA, 50% S	39.0	1331
2	25g SA, 50% S	56.0	1357
3	15g SA, 50% S	42.0	1544
4	10g SA, 50% S	41.0	1471
5	50g SA, 95% S	44.0	1243
6	25g SA, 95% S	36.0	1412
7	15g SA, 95% S	49.0	1956
8	10g SA, 95% S	43.0	1843
9	Control	44.0	1349

Cucumber plants under different sulfur amendment treatments



Plant Height of Yellow Pepper

Sample No.	Sample	After One Month	After Two Months	After Three Months
1	50g SA ,50% S	43	89	102
2	25g SA, 50% S	45	91	107
3	15g SA, 50% S	40	92	117
4	10g SA, 50% S	45	96	114
5	50g SA, 95% S	44	95	119
6	25g SA, 95% S	49	103	124
7	15g SA, 95% S	44	103	123
8	10g SA, 95% S	42	103	133
9	Control	35	88	109

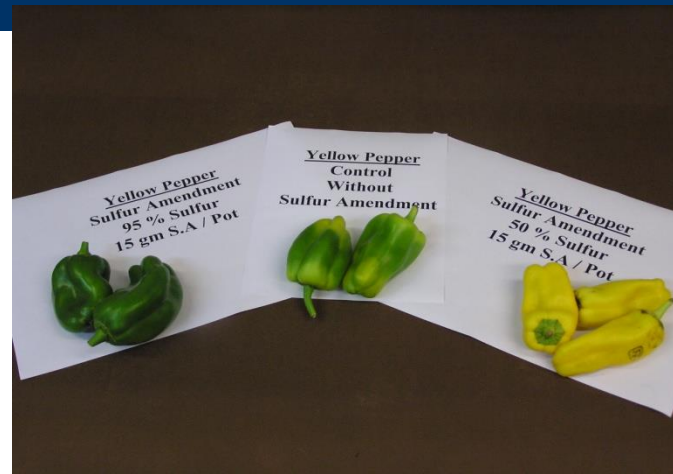
Sugar Profile of Yellow Pepper

Sample No.	Sample	Sugars			
		Fructose %	Glucose %	Sucrose %	Total Sugar %
1	50g SA ,50% S	12	7	0.3	19
2	25g SA, 50% S	15	12	0.7	28
3	15g SA, 50% S	12	11	0.1	23
4	10g SA, 50% S	9	9	1.6	20
5	50g SA, 95% S	14	12	2.7	29
6	25g SA, 95% S	14	10	1.7	26
7	15g SA, 95% S	9	6	20	35
8	10g SA, 95% S	14	10	1.1	25
9	Control	12	9	4.7	26

Total Yield of Yellow Pepper

Sample No.	Sample ID	Total Harvest	
		Fruit #	Wt (gm)
1	50g SA ,50% S	4	138
2	25g SA, 50% S	10	392
3	15g SA, 50% S	9	339
4	10g SA, 50% S	9	507
5	50g SA, 95% S	7	369
6	25g SA, 95% S	5	294
7	15g SA, 95% S	13	581
8	10g SA, 95% S	9	514
9	Control	2	106

Yellow pepper plants under different sulfur amendment treatments



Plant Height of Red Pepper

Sample No.	Sample ID	After One Month	After Tow Months	After Three Months
1	50g SA ,50% S	37	89	115
2	25g SA, 50% S	36	85	117
3	15g SA, 50% S	38	91	123
4	10g SA, 50% S	41	90	130
5	50g SA, 95% S	32	90	132
6	25g SA, 95% S	36	93	133
7	15g SA, 95% S	38	98	139
8	10g SA, 95% S	37	90	134
9	Control	37	90	107

Sugar Profile of Red Pepper

Sample No.	Sample ID	Sugars			Total Sugar %
		Fructose %	Glucose %	Sucrose %	
1	50g SA ,50% S	14	7	0.52	21
2	25g SA, 50% S	-	-	-	-
3	15g SA, 50% S	14	10	0.21	24
4	10g SA, 50% S	14	11	0.31	25
5	50g SA, 95% S	15	13	0.2	28
6	25g SA, 95% S	15	8	0.1	23
7	15g SA, 95% S	14	6	0.3	20
8	10g SA, 95% S	12	7	0.34	20
9	Control	17	11	0.5	28

Total Yield of Red Pepper

Sample No.	Sample ID	Total Yield	
		Fruit #	Wt. gm
1	50g SA, 50% S	1	53
2	25g SA, 50% S	2	37
3	15g SA, 50% S	2	138
4	10g SA, 50% S	2	160
5	50g SA, 95% S	3	165
6	25g SA, 95% S	3	195
7	15g SA, 95% S	4	473
8	10g SA, 95% S	10	224
9	Control	3	115

Red pepper plants under different sulfur amendment treatments



Conclusion

- **15 g of sulfur amendment (95 % S) per pot is the most cost effective rate of sulfur amendment application for the four tested agricultural crops.**
- **This rate is equivalent to 240 kg per Donum.**