

1 | ***Original Research Article***

2 | **EFFECT OF POTASSIUM AND SULPHUR ON GROWTH, YIELD AND**
3 | **PRODUCTIVITY OF CORIANDER (*Coriandrum sativum*L.)**

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6 | **Abstract**

7 | A field experiment “Response of coriander (*Coriandrum sativum* L.) to potassium and
8 | sulphur” was conducted at S D Agricultural University, Gujarat during *rabi* season2021-22 on
9 | loamy sand soil. The experiment comprised of 9 treatment combinations. Application of 40 kg
10 | K₂O/ha significantly influenced the growth *viz.*, plant height at 60, 90 DAS and at harvest,
11 | number of primary, secondary, tertiary branches per plant and yield attributes *viz.*, number of
12 | umbels per plant, seed yield per plant, 1000 seed weight as well as seed and straw yields. The
13 | maximum seed and straw yields were recorded under the application of 30 kg S/ha. ~~Sim~~
14 | similarilar response trend was also observed in growth and yield attributes.

15 | Keywords: - Coriander, Potassium, Sulphur, Growth and Yield

16 | **Introduction**

17 | Coriander (*Coriandrum sativum* L.) ~~is belongs~~belongs to *Apiacea*family and originated
18 | from the Mediterranean region. It is commonly known as "Dhania" or "Dhana". It is one of the
19 | earliest seed spices and leafy vegetable crop used by mankind. The aromatic odour in coriander
20 | is due to the presence of essential oil ranges from 0.1 to 1.3 ~~percent-per cent~~in dry seeds.
21 | Coriander powder and its essential oil are considered as natural food preservatives including
22 | antibacterial, antifungal and antioxidant properties (Bhat *et al.*, 2014). Potassium (K) improves
23 | quality and yield of spices (Sadanandan, 1993). It has also a role in stomatal respiration,
24 | photosynthetic transfer, crop development etc. The high mobility of potassium permits it to move
25 | quickly from cell to cell or from older parts to newly developed tissues and storage organs
26 | (Sadanandan and Hamza, 1998). Sulphur is essential for the formation of chlorophyll and the
27 | synthesis of several vitamins and amino acids *i.e.*, cystine, cysteins and methionine and it also
28 | helps in photosynthesis and nitrogen fixation (Patel *et al.*,2013). The interactions of sulphur with
29 | other nutrients improve the quality of crops. Sulphur is involved in the sulphydryl linkages
30 | which provide the source of pungency in oil.

31 |
32 | **Material & method**

33 | A study was conducted during *rabi* season of 2021-22 at the Agronomy Instructional
34 | Farm, SardarkrushinagarDantiwada Agricultural University, Sardarkrushinagar, Gujarat. The
35 | experiment comprises of 9 treatment combinations(**Table 1**). The crop growing season
36 | experienced 7 to 15°C minimum temperature and 31 to 37°C maximum temperature. The soil of
37 | experimental site was loamy sand having 0.23 % organic carbon, 7.10 pH,158, 43.42, 281 and
38 | 8.2 kg/ha available N, P, K and S, respectively. “Gujarat coriander 3” was sown on 18
39 | November 2021 at 30 cm using seed rate of 15 kg/ha and was harvested on 15 March 2022.As
40 | per treatments, the entire quantity of elemental sulphur was applied before one month of sowing

41 | in the previously opened furrow. According to treatment, the full dose of potassium was applied
 42 | at the time of sowing in a previously opened furrow in the form of a Murite of potash. As per
 43 | recommendation, half nitrogen and full phosphorus were applied as basal dose in the previously
 44 | opened furrows to all the plots in form of urea and DAP, respectively. Remain half dose of
 45 | nitrogen was applied at 30 DAS through urea as top dressing before vapsa condition at the
 46 | evening.

47

48 | **Results & discussion**

49 | **Effect of potassium**

50 | Among the different treatments, significantly-significant superiority of 40 kg K₂O/ha
 51 | overall growth significantly enhanced plant height at 60, 90 DAS and at harvest, primary,
 52 | secondary, and tertiary branches per plant. This might be due to the high availability of
 53 | potassium enhances root development by producing more branching and lateral roots (Egilla *et al.*,
 54 | *2001*). Moreover, during the initial stage, better nutritional environment also enhance
 55 | enhances the vegetative growth. These finding-findings were in line with Ali *et al.* (2015) and
 56 | Bhuva (2017). The yield attributing characters *viz.*, number of umbels per plant, seed yield per
 57 | plant, 1000-seed weight, seed and straw yields recorded highest under 40 kg K₂O/ha were at par
 58 | with 20 kg K₂O/ha except in the case of the number of umbellate per umbel and number of seeds
 59 | per umbellate where 40 and 20 kg K₂O/ha were not differ-differing remarkably. These might be
 60 | due to potassium plays an important role in cell division and cell elongation in meristamate
 61 | meristematic cells, maintenance of turgor pressure, stomatal activity, photosynthetic transfer
 62 | leading to the development of better root and shoot growth, ensuring timely and uniform
 63 | ripening of the crop. Thus, an adequate supply of potassium might be responsible for profuse
 64 | vegetative growth in terms of plant height and number of branches per plant which resulted in
 65 | higher yield. Similar finding-findings were also reported by Bhoja (2008), Bhuva (2017), Solanki
 66 | *et al.* (2017) and Davara *et al.* (2019). The harvest index was not remarkably influenced by levels
 67 | of potassium.

68 | **Table 1: Effect of various levels of potassium and sulphur on plant height (cm) and number**
 69 | **of branches per plant of coriander**

Treatments	Plant height (cm)				Number of branches per plant		
	30 DAS	60 DAS	90 DAS	At harvest	Primary	Secondary	Tertiary
[A] Levels of potassium (K)							
K ₁ : 0 kg/ha	10.48	38.26	67.43	83.34	4.46	7.50	12.88
K ₂ : 20 kg/ha	11.21	42.64	72.95	89.70	5.05	8.69	14.32
K ₃ : 40 kg/ha	11.50	44.17	74.75	92.40	5.29	9.05	15.06
S.Em.±	0.29	1.32	1.79	1.99	0.11	0.19	0.31
CD (P=0.05)	NS	3.84	5.22	5.81	0.33	0.55	0.89
[B] Levels of sulphur (S)							
S ₁ : 0 kg/ha	10.66	38.56	67.53	83.94	4.56	7.71	12.97
S ₂ : 15 kg/ha	11.14	42.76	73.34	90.03	5.07	8.55	14.48

S ₃ : 30 kg/ha	11.40	43.75	74.26	91.97	5.18	8.98	14.82
S.Em.±	0.29	1.32	1.79	1.99	0.11	0.19	0.31
CD (P=0.05)	NS	3.84	5.22	5.81	0.33	0.55	0.89
Interaction (K×S)	NS	NS	NS	NS	NS	NS	NS
C. V. %	9.17	10.95	8.65	7.79	7.84	7.72	7.54

70
71 **Table 2: Effect of various levels of potassium and sulphur on yield attributes and yield of**
72 **coriander**

Treatments	No. of umbels per plant	No. of umbellates per umbel	No. of seeds per umbellate	Seed yield per plant (g)	1000-seed weight (g)	Seed yield (kg/ha)	Straw yield (kg/ha)	Harvest index (%)
[A] Levels of potassium (K)								
K ₁ : 0 kg/ha	14.61	5.83	5.46	3.50	12.55	1083	1498	42.53
K ₂ : 20 kg/ha	16.63	6.21	5.84	3.87	13.48	1249	1617	43.21
K ₃ : 40 kg/ha	16.83	6.31	6.13	4.18	13.99	1324	1706	43.57
S.Em.±	0.33	0.16	0.15	0.12	0.29	36	40	0.31
CD (P=0.05)	0.95	NS	NS	0.35	0.85	107	116	NS
[B] Levels of sulphur (S)								
S ₁ : 0 kg/ha	14.84	5.96	5.65	3.48	12.58	1121	1492	42.72
S ₂ : 15 kg/ha	16.37	6.11	5.77	3.97	13.67	1240	1615	43.37
S ₃ : 30 kg/ha	16.85	6.28	5.01	4.09	13.77	1296	1694	43.23
S.Em.±	0.33	0.16	0.15	0.12	0.29	36	40	0.31
CD (P=0.05)	0.95	NS	NS	0.35	0.85	107	116	NS
Interaction (K×S)	NS	NS	NS	NS	NS	NS	NS	NS
C. V. %	7.08	8.92	8.80	11.54	7.68	10.41	8.59	2.52

73
74 **Effect of sulphur**

75 Application of 30 kg S/ha gave significantly higher plant height, primary, secondary,
76 tertiary branches per plant. These may be due to adequate application of sulphur improved ~~over~~
77 ~~the~~ overall nutritional environment of the *Rhizosphere* as well as ~~the~~ plant system and ~~is~~ more
78 advantageous for better root and shoot growth which resulted in profuse vegetative growth in
79 terms of plant height and number of branches per plant. These ~~finding~~ ~~findings~~ ~~were~~ corroborate
80 the results reported by Pratap *et al.* (2003) and Kumar (2018). The maximum number of umbels
81 per plant, seed yield per plant, 1000-seed weight, seed and straw yields ~~were~~ recorded when ~~the~~
82 crop received 30 kg S/ha and was at par with 15 kg S/ha but significantly superior over 0 kg
83 S/ha. However, ~~the~~ number of umbellate per umbel and ~~the~~ number of seeds per umbellate were
84 not differed remarkably due to ~~the~~ application of different levels of sulphur. Adequate
85 application of sulphur helps in stimulating photosynthesis and synthesis of ~~sulphur~~ ~~Sulphur~~-
86 containing amino acids, proteins, ~~and~~ chlorophyll as well as increased ~~carbohydrates~~
87 ~~carbohydrate~~ metabolism. ~~Which~~ ~~This~~ resulted in profuse vegetative growth, *i.e.*, plant height and
88 number of branches per plant as well as yield attributes *i.e.*, number of umbels per plant, seed
89 yield per plant and test weight consequently increased seed and straw yield. These ~~finding~~
90 ~~findings~~ were in accordance with reported by Patel *et al.* (2013), Solanki *et al.* (2017) and Kedir
91 (2021). Sulphur level was not influenced remarkably on ~~the~~ harvest index.

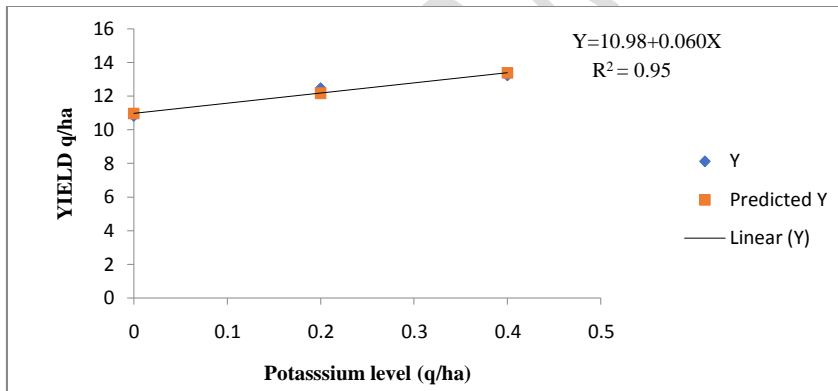
92 [Effects of potassium and Sulphur on plant growth and yield](#)

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98 **Regression analysis of coriander yield and nutrient level**

99 The relationship between data of coriander yield and nutrients level was developed by
100 regression analysis taking Y dependent variable and X (nutrients level). The regression equation
101 was $Y=10.98+0.060X$ ($R^2= 0.95$) for potassium and $Y=11.31+0.058X$ ($R^2= 0.95$) for sulphur
102 level. The coefficient of determination was ($R^2 =95\%$) for both the parameters. [\(add interpretation
103 of findings of COD \$R^2\$ with references \)](#)

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106 Fig 1 : Graphical representation of yield vs potassium level.

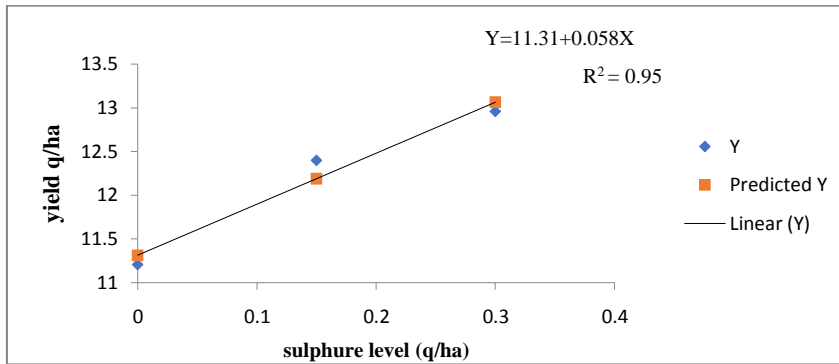


Fig 2: Graphical representation of yield vs sulphure level.

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109 Conclusion

110 Based on finding, it is concluded that coriander crop should be fertilized with 20 kg
 111 K_2O/ha and 15 kg S/ha for obtaining higher growth and yield.

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