EFFECT OF DIFFERENT LEVELS AND SOURCES OF SULPHUR ON
GROWTH, YIELD AND GRAIN QUALITY OF BASMATI RICE
(ORYZA SATIVA L.) CV. PUSA BASMATI-2

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ABSTRACT

A field experiment was carried out during the Kharif season of 2000, with the object to study
the effect of Different Levels and Sources of Sulphur on Growth, Yield and Grain Quality of Basmati
rice (oryza sativa L.) cv. Pusa Basmati-2. The maximum panicle length (29.69 cm), grain yield
(45.86 q/ha), harvest index (35.58 %) and protein content (13.17%) was obtained when sulphur
was applied at the rate of 30 kg/ha. Among the different sources of sulphur single superphosphate
gave the best results in yield (44.98 q/ha), no of tillers (8.77) and harvest index (33.46%).

Sulphur is essential for plant development and growth, since it is a
constituent of certain amino acids like cystine, and methionine. Due to the use of high analysis
S-free fertilizers, intensive agriculture and declining use of sulphur as fungicides and
insecticides, deficiencies are visible worldwide and the crops are not yielding to their potential.
Hence, this study was conducted to establish
the effect of various doses of sulphur in different
forms on growth, yield and grain quality of
Basmati rice.

A field experiment was conducted at
Allahabad Agricultural Institute-Deemed
University, Allahabad during kharif season of
2000. The soil of the field was sandy loam in
 texture with 0.24 % organic carbon, 110 kg/ ha available nitrogen, 47 kg/ha available phosphorus, 239 kg/ha available potassium,
7.75 ppm sulphur, pH of 7.4 and EC 0.21
mmhos/cm. The experiment was laid out in
4x3 factorial randomized block design
consisting of 12 treatments replicated thrice.
The treatments comprised of four sources of
sulphur, ammonium sulphate, single super
phosphate and elemental sulphur each at 0,
10, 20, 30 kg/ha. The seedlings were
transplanted at 20 days after sowing at a
spacing of 20 x 15 cm. NPK @ 100, 60, 60
kg/ha was applied to the crop. Sulphur free
fertilizers like urea and DAP was used. Half of
the nitrogen and potash and the total quantity
of phosphorous was applied at field
preparation and the remaining at panicle
initiation stage. Sulphur was applied in two
splits; one before transplanting and the other
before panicle initiation at 0, 10, 20, 30 kg/
ha according to the treatments.

Levels of sulphur: Maximum panicle
length (29.69 cm), grain yield (45.86 q/ha),
harvest index (35.58%) and protein content
(13.17%) were obtained when sulphur was
applied at 30kg/ha. Test weight was found to
be slightly more (20.93 g) Table 1, when
sulphur was applied at 20 kg/ha. The better
yield and yield attributes in rice may be due to
the better absorption and assimilation of other
elements like N, P, K by the increasing levels
of sulphur. The above findings is in agreement
with Malavizhi et al. (1993) who reported that
increasing levels of sulphur resulted in
successive in creases in grain and straw yield,
and Sakal et al. (1999) who reported that
protein in rice was increased from 7.93-9.23%
with optimum sulphur levels.

Sources of Sulphur: Application of
sulphur in the form of single super phosphate
resulted in maximum number of effective tillers
per hill (8.77), grain yield (44.98 q/ha) and
harvest index (33.46 %). While, the maximum
Table 1. Effect of different levels and sources of sulphur on the growth and grain quality of Basmati rice (Oryza sativa L.) cv. Pusa Basmati-2

<table>
<thead>
<tr>
<th>Levels of Sulphur kg/ha</th>
<th>No. of effective Panicle tillers</th>
<th>Panicle length (cm)</th>
<th>Test weight (g)</th>
<th>Harvest index %</th>
<th>Protein content %</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>7.00</td>
<td>29.62</td>
<td>19.04</td>
<td>32.15</td>
<td>12.33</td>
</tr>
<tr>
<td>10</td>
<td>8.82</td>
<td>28.84</td>
<td>20.51</td>
<td>33.13</td>
<td>12.52</td>
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<tr>
<td>20</td>
<td>9.20</td>
<td>29.65</td>
<td>20.93</td>
<td>33.47</td>
<td>12.82</td>
</tr>
<tr>
<td>30</td>
<td>8.91</td>
<td>29.69</td>
<td>20.62</td>
<td>33.58</td>
<td>13.17</td>
</tr>
<tr>
<td>SEm</td>
<td>0.72</td>
<td>0.36</td>
<td>0.21</td>
<td>0.37</td>
<td>0.07</td>
</tr>
<tr>
<td>C.D(5%)</td>
<td>1.49</td>
<td>0.75</td>
<td>0.43</td>
<td>0.76</td>
<td>0.13</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sources of Sulphur</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium sulphate</td>
<td>8.165</td>
<td>30.22</td>
<td>20.60</td>
<td>32.75</td>
<td>12.65</td>
</tr>
<tr>
<td>Single superphosphate</td>
<td>8.77</td>
<td>29.77</td>
<td>20.55</td>
<td>33.46</td>
<td>12.32</td>
</tr>
<tr>
<td>Elemental sulphur</td>
<td>8.52</td>
<td>29.44</td>
<td>19.69</td>
<td>33.03</td>
<td>12.57</td>
</tr>
<tr>
<td>SEm</td>
<td>0.62</td>
<td>0.72</td>
<td>0.21</td>
<td>0.32</td>
<td>0.054</td>
</tr>
<tr>
<td>C.D(5%)</td>
<td>1.29</td>
<td>1.5</td>
<td>0.43</td>
<td>0.66</td>
<td>0.11</td>
</tr>
</tbody>
</table>

Table 2. Interaction effect of levels and sources of sulphur on the yield of rice, cv- Pusa Basmati-2

<table>
<thead>
<tr>
<th>Levels of sulphur kg/ha</th>
<th>Ammonium sulphate</th>
<th>Single Superphosphate</th>
<th>Elemental Sulphur</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>42.30</td>
<td>42.34</td>
<td>42.47</td>
<td>42.37</td>
</tr>
<tr>
<td>10</td>
<td>42.76</td>
<td>44.37</td>
<td>43.39</td>
<td>43.51</td>
</tr>
<tr>
<td>20</td>
<td>44.73</td>
<td>46.23</td>
<td>44.25</td>
<td>45.07</td>
</tr>
<tr>
<td>30</td>
<td>47.04</td>
<td>46.98</td>
<td>43.56</td>
<td>45.86</td>
</tr>
<tr>
<td>Mean</td>
<td>44.21</td>
<td>44.98</td>
<td>43.42</td>
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</tbody>
</table>

Sources of sulphur: SE m ± 0.74
C.D(5%) 1.55
Levels of sulphur: SE m ± 0.86
C.D(5%) 1.79
Interaction: SEm± 1.49
C.D(5%) 3.10

test weight (20.60 g) and protein content (12.65%) was found with the application of elemental sulphur (Table 1). This may be due to the better sulphur use efficiency, when applied in the form of single superphosphate and increased sulphur concentration at the root zone, which enables better uptake. Mondal et al. (1994) observed that grain yields were higher in rice when applied with single superphosphate. Ismundji et al. (1978) observed that methionine content was higher with elemental sulphur, which was again observed in the experiment.

Interaction of Sulphur Levels and Sources: It can be seen from the Table 2, that maximum yield (45.86 g/ha) was obtained when sulphur was applied at 30kg/ha, and single superphosphate gave a maximum yield of (44.98 g/ha). But it can also be seen that interaction effect of ammonium sulphate at 30kg/ha gave the maximum yield of 47.04 g/ha, as compared to other treatments. This may be due to better absorption, translocation and utilization of sulphur in form of ammonium sulphate and also due to extra nitrogen available in ammoniacal form, which is more efficiently used in the flooded crop of paddy along with uniform uptake of sulphur. This is in line with the findings of Rashid et al. (1992) who reported that rice responded well to
ammonium sulphate, elemental sulphur and urea. Sulphur at slightly higher rates gave better yields as compared to other sources.

REFERENCES