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# Potassium management through foliar nutrition for enhanching yield and fibre quality of rainfed cotton

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**ABSTRACT:** A field experiment was conducted to study the effect of foliar spray of water soluble K fertilizers on rainfed cotton for 2 years during *kharif* 2010-2011, 2011-2012 in black cotton soil at Cotton Research Station, Veppanthattai. The treatments were recommended dose of fertilizers (RDF) (NPK 120:60:60kg/ha), RDF in combination with foliar nutrient Kcl (1%), poly feed, $KNO_3$, mono potassium phosphate and poly (2%) feed, $KNO_3$, mono potassium phosphate at 75 and 90 days after sowing. The experiment was laid out in randomized block design with 3 replications. Application of recommended dose of fertilizers (NPK 120:60:60kg/ha) combined with foliar nutrition of mono potassium phosphate (1%) or poly feed (1%) at 75 and 90 days after sowing registered higher seed cotton yield, lint yield, ginning outturn and net profit.

**Key words:** Cotton, foliar nutrition, potassium, seed cotton yield

Cotton (*Gossypium hirsutum* L.) is the most important fibre crop. Cotton is known to have a high requirement for K. Potassium plays an important role in cotton fibre development and shortage will result in poorer fibre quality and lower yields. All nutrients are needed during the plant entire growth cycle, but the need for potassium rises dramatically when bolls are set on the plant. Peak need of potassium is during boll filling and to be available at this time potassium must be in solution where late-season roots are inactive. Though soil application is the best way to supply all fertilizer nutrients foliar potassium partially satisfy potassium demand of cotton at boll forming stages. Since K plays an important role in fibre development, enzyme activation, pH balance in the cell, translocation of carbohydrates, plant health and disease suppression, supplying the crop with potassium through foliar spray could possibly meet the crop demand when uptake process has slowed. Lint yield were depressed when cotton was grown under K deficient soil. Yield earliness increased numerically with foliar application of K over the control. Foliar spray of water soluble fertilizer has increased the seed cotton yield as compared to 100 per cent basal application of K. Since Perambalur district has the largest cotton area in Tamil Nadu, the yield potential of rainfed cotton is to be exploited by foliar spray of potassium at development stages. To attain the maximum benefit by adopting foliar spray is only possible by standardizing the concentration of foliar spray and best source of K fertilizers. Hence, the present investigation was undertaken to study the effect of foliar spray of water soluble K fertilizers on seed cotton yield and fibre quality of rainfed cotton.

## MATERIALS AND METHODS

A field study was conducted during *kharif* 2010-2011, 2011-2012 at Cotton Research Station, Veppanthattai, Perambalur district of Tamil Nadu. The soil of experimental site was deep black cotton soil, low in available nitrogen (126kg/ha), medium in available phosphours (23kg/ha) and medium in available potassium (186kg/ha) with pH 8.20 and EC 0.13/dSm and organic carbon 4.8g/kg.

The experiment was laid out in randomized block design with 8 treatments comprising of 3 replications. The treatments were recommended dose of fertilizers (RDF) (NPK 120:60:60kg/ha), RDF in combination with foliar nutrition of Kcl (1%), poly feed, $KNO_3$, mono

potassium phosphate and poly feed (2%), $KNO_3$, mono potassium phosphate at 75 and 90 days after sowing. Cotton variety RCH 2 *Bt* BG II was sown on first fortnight of September in both the years at 90x45 cm spacing. Full dose of P and half of K and 1/3 nitrogen were applied as basal dose remaining N was applied at 40 and 60 DAS in two equal splits and the remaining half of K was applied along with nitrogen at 60 DAS. The rain fall received during 2010-2011, 2011-2012 was 1091.0 mm in 43 rainy days and 886.0mm in 37 rainy days, respectively. The observation related to growth and yield were recorded and subjected to statistical analysis.

## RESULTS AND DISCUSSION

The results indicated that foliar application of water soluble K fertilizers at different concentration significantly influenced the growth characters, yield attributes, yield and quality character of rainfed cotton except the monopodial branches/plant. It is obvious from the results presented in Table1 that treatment $T_7$ on pooled basis recorded consistently higher plant height, more sympodial branches/plant, higher bolls/plant and boll weight and was *on par* with the treatment $T_3$, $T_5$ and $T_2$. The seed cotton yield was significantly influenced due to foliar application of water soluble K fertilizer sources. The maximum seed cotton yield was produced under the treatment foliar nutrition of 1 per cent mono potassium phosphate($T_7$) at 75 and 90 days after sowing along with recommended dose of fertilizer during individual year as well as on pooled basis and it was *on par* with the treatment $T_3$ and $T_5$ and significant over all other treatments. Yield increase recorded on the foliar nutrition of K as water soluble fertilizer at boll development stages was mainly because of an increase in boll number/plant. Boll number and boll weight are main determinants of seed cotton yield. Patel *et al.,* (2012). Spraying water soluble source of K fertilizers at boll formation and development stages might have helped the plants better absorption and consequent assimilation of nutrient supplied through foliar application resulting in luxuriant growth and development which led to higher yield. Increase in boll number with application of K has been reported by Brar and Brar (2004).

Foliar nutrition of 1 per cent mono potassium phosphate at 75 and 90 days ($T_7$) after sowing registered higher ginning outturn and lint yield during both the years and also on pooled basis and it was *at par* with the treatments $T_3$, $T_5$ and $T_2$. Lower growth characters, yield attributes, seed cotton yield, ginning percentage and lint yield were recorded in the treatment $T_1$ which received only recommended dose of

**Table 1.** Plant height, yield attributes and seed cotton yield as influenced by foliar nutrition of K fertilizer (Pooled mean)

| Treatments | Plant height (cm) | Sympodial branches/ plant | Bolls/ plant | Boll weight (g) | Seed cotton yield (kg |
|---|---|---|---|---|---|
| **$T_1$** Recommended dose of fertilizers (RDF) | 102.8 | 16.5 | 18.2 | 4.0 | 1379 |
| **$T_2$** RDF + (1%) Kcl* | 109.8 | 18.2 | 24.4 | 4.4 | 1518 |
| **$T_3$** RDF + (1%) poly feed* | 116.3 | 19.6 | 27.2 | 4.7 | 1644 |
| **$T_4$** RDF + (2%) poly feed* | 108.3 | 17.7 | 22.4 | 4.3 | 1425 |
| **$T_5$** RDF + (1%) $KNO_3$* | 114.2 | 18.7 | 26.4 | 4.6 | 1584 |
| **$T_6$** RDF + (2%) $KNO_3$* | 105.5 | 16.7 | 20.5 | 4.3 | 1437 |
| **$T_7$** RDF + (1%) mono potassium phosphate* | 120.7 | 21.7 | 28.4 | 4.9 | 1678 |
| **$T_8$** RDF + (2%) mono potassium phosphate* | 108.5 | 17.1 | 23.8 | 4.4 | 1490 |
| SE m± | 3.37 | 1.04 | 1.10 | 0.1 | 45.01 |
| P=0.05 | 9.31 | 2.71 | 3.06 | 30.32 | 114.22 |

*Foliar nutrition at 75 and 90 days.

**Table 2.** Influence of treatments on quality characters and economics of cotton (Pooled mean)

| Treatments | Lint yield (kg/ha) | Ginning per centage | 2.5 per cent span length (mm) | Uni-formity ratio (%) | Micronaire value (µg/ inch) | Fibre strength (g/tex) | Elongation (%) | Net return (Rs/ha) | Benefit cost ratio |
|---|---|---|---|---|---|---|---|---|---|
| $T_1$ Recommended dose of fertilizers (RDF) | 446 | 32.30 | 28.6 | 48.5 | 4.30 | 21.26 | 5.64 | 36,771 | 2.17 |
| $T_2$ RDF + (1%) Kcl* | 538 | 35.42 | 28.7 | 48.5 | 3.75 | 21.50 | 6.20 | 43,628 | 2.37 |
| $T_3$ RDF + (1%) poly feed* | 585 | 35.47 | 28.3 | 52.0 | 4.55 | 20.65 | 6.46 | 48,816 | 2.52 |
| $T_4$ RDF + (2%) poly feed* | 478 | 33.51 | 28.7 | 49.0 | 4.15 | 21.80 | 5.85 | 38,608 | 2.18 |
| $T_5$ RDF + (1%) $KNO_3$* | 562 | 35.46 | 28.2 | 47.0 | 3.95 | 20.74 | 6.35 | 45,591 | 2.42 |
| $T_6$ RDF + (2%) $KNO_3$* | 466 | 32.40 | 28.0 | 47.5 | 4.10 | 22.76 | 6.00 | 39,098 | 2.32 |
| $T_7$ RDF + (1% Mono potassium phosphate* | 604 | 36.00 | 27.6 | 51.0 | 4.10 | 21.60 | 6.56 | 50,798 | 2.58 |
| $T_8$ – RDF + (2%) mono potassium phosphate* | 503 | 33.63 | 28.6 | 48.5 | 4.10 | 21.30 | 6.14 | 40,718 | 2.25 |
| SE m± | 33.93 | 0.3 | 2.2 | 4.5 | 0.50 | 1.60 | 0.75 | | |
| P=0.05 | 93.42 | 80.64 | NS | NS | NS | NS | NS | | |

*Foliar nutrition at 75 and 90 days.

fertilizers. Cotton crop present a strong demand on plant available K especially during the boll development and maturation. How ever the uptake of nutrients especially potassium from the soil may not be compensated due to inactive nature of late season roots.

Potassium application did not make any significant change in fibre quality parameters such as span length, uniformity rates, micronaire value, fibre strength and elongation, which was more or less statistically at par in all the treatments of potassium applied on foliar in cotton crop. Blaise *et al.,* (2009) reported that K application did not impact fibre quality.

In case of economics, foliar nutrition of 1 per cent mono potassium phosphate at 75 and 90 days on cotton along with recommended dose of fertilizer (NPK 120:60:60 kg/ha) accrued the highest net return with more BC ratio. This was due to the fact that the total cost involved for foliar nutrition (2 spray) alone was Rs.965/ha with the yield enhancement ranging from 291 kg/ha (2010-2011) to 307kg/ha (2011-2012).

## REFERENCES

**Blaise, D., Singh, J.V. and Bonde. 2009.** Response of rainfed cotton (*Gossypium hirsutum*) to foliar application of potassium. *Indian Jour. Agron.* **54** : 444-48

**Brar,M.S. and Brar, A.S.2004.** Foliar nutrition as a supplement to soil fertilizer application to increase yield of upland cotton. *Indian Jour Agri Sci.* **74** : 472-75.

**Patel, J.F., Kumar,V., Usadadia, V.P., Sutaria, C.M., Sankat, K.B.and Parmar, R.R. 2012.** Effect of foliar spray of potassium nitrate on growth, yield and fibre quality of *Bt* cotton (*Gossypium hirsutum*). *Green farming.* **3 :** 67-68.

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