# Effect of Transport and Accumulation of $K^+$ on Stomata Resistance

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**Abstract:** In order to study the stomata physiological changes and the impact of $K^+$ cautions move on its changes, research was performed in agronomic research in three years (2000-2003). This research uses factorial experiment design randomized complete block with 4 replications. The factors were different levels of drought stress (S) & different periods of growth (V) with changing the values potassium fertilizer in years study. Measuring process transfer and accumulation of cautions $K^+$ distances longitudinal single Plant A =70, B =140-70 and C >140 cm height from the floor indicated that the accumulation of $K^+$ leaf total single plant of 1.92 $g\ plant^{-1}$ in the control treatment (no water stress) to 3.45 $g\ plant^{-1}$ treatment (severe treatments water stress) increases Potassium can be found and the process of emptying the lower leaves (A) to the upper leaves (B and C) increased. In water stress treatment, 50 percent of the total potassium was accumulated in the leaves of a plant height of A, but with stress, 30 percent of the amount discharged and leaves the upper transferred but the transfer could not resist opening convention in stress severely cut, causing back staying openings be such convention that transport $K^+$ to the leaves of high resistance, small opening of the 5.81 $s / cm$ in the treatment without stress to the 9.86 $s / cm$ increased and stomata begin to close said. But tensions gentle presence $K^+$ prevented the closure of the openings were. With increasing $K^+$ fertilizer in the years after testing, assembly the caution in plant leaves was more highly. In the early stages of plant growth, when enough water was available, stomata resistance from its incidence was slightly but imposing severe stress and reproductive growth periods and filling seeds, stomata resistance was increased significantly, the lower leaf surface stomata resistance levels much higher than the leaf supernatant.

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## 1. Introduction

In addition to anatomical and morphological changes, changes in plant metabolic reactions, different reactions of the show, but the lack of water and Biophysics biochemical reactions in plants can be seen below:

A. The cell osmotic potential, and increased suction power.

B. The leaves are covered with a protective layer and stomata closure and reduced transpiration.

C. Changes in proteins and nucleic acids (Kasele 1995).

Changes in anatomical and morphological and reduced transpiration in the dry condition is considered, and these changes include increased thickness of the cuticle, the layer of wax, falling leaves, and opening and closing of stomata, which main role plays, as was(Kasele 1995).

declared that the osmotic pressure, the ions K+, increase is that it increases the potential for pressure cells, especially cells that cover the openings of the cells around them and the opening hole of the search, even if the conditions of stress, water, ion transport $K^+$ into cells. Protection and stimulation of stomata opening was (Kasele 1995). Research on corn and sorghum showed that the vegetative growth, low water potential, the leaves that the light are located, the stomata close, but the closed form completeness are not the strength of the openings in -20 bar ten seconds centimeter was calculated, the reproductive, stomata resistance of leaves of maize and sorghum with fluctuations in water potential did not change, the hole in the reproductive phase to water stress sensitivity showed in maize stomata closure in -8 bar was started. Effects of water stress on stomata opening and closing 15 to 20 minutes Take, that the effect of CO2 concentration on stomata opening and closing, which is very fast and about 2.5 to 5 minutes, longer time is allocated to(Slavic 1974).

## 2. Material and Method

Research projects in the form of factorial experiment with application of complete randomized block design (CRBD) with 4 replications and 2 factors in 3 years were performed. Factors of different levels of drought stress (S) in different periods of growth (V) by changing the values potassium fertilizer in years study sampled each plate based on 1m length ($100\times75cm^2$) one time in fourteen days.

In each sample we planted 4-5 corn plant in plastic bag so that we could analyze the nutrient elements in plants. Installing *Parshal Flume* and also taking water meter, the amount of water input to each plot and control were applied. Determine the nutrient once every 14 days from each plot based on a linear meters ($75\times100$ $Cm^2$) were sampled, 5-4 plants in each sample after placing in a plastic bag immediately to the laboratory and analyzed to determine the nutrient was sent, that some of these samples to determine nutrient as follows were used:

**2.1. Measurement of potassium in plants**

the amount of 2 g of plant sample was beaten and practice get ashes dry heat than 480 ° C was performed after the ash in acid solution with a photometer methods to estimate the size of two elements were measured. To determine the number of sodium Samples from the device 2-5 Data analysis method and type of computer software Plan for statistical analysis of variance, raw data, a factorial experiment design based Randomized complete block with 4 replications that comparison data for analysis by a Duncan multiple range test was used(Wilson 1983).

Table 1. The Treatments in experiment

| Drought stress | Different growth period |
|---|---|
| $S_0$ : Full irrigation point of FC, control, without water stress | $V_1$: growing phase, the establishment of the plant stem to the emergence |
| $S_1$ : 75% of the amount of irrigation treatments $I_0$, mild stress | $V_2$: natal phase: to stem the rise of coffee being resilient and end silk pollination |
| $S_2$ : 50% of the amount of irrigation treatments $I_0$, severe stress | $V_3$: grain filling phase: the end of pollen grain maturity and the emergence of black layer |
| $S_3$ : 25% of the amount of irrigation treatment $I_0$, very severe stress and point of PWP | ----------- |

**3. Results**

**3.1. $K^+$ accumulation process**

Single longitudinal distances (A =70, B=40-70, C= 140 cm from the floor) gave the following results:

1) With increasing severity of water stress, leaf total K accumulation per plant was increased significantly from 1.92 in the control treatment (no water stress) to 3.45 treatment (severe water stress treatment) can be increased.

2) With increasing water stress intensity, K discharging process of the lower leaf a high intensity and this was causing more accumulation of K B and C were high. Treatment without water stress, 50 percent of the total K Accumulated in the leaves of a plant height was measured by A, but applied different treatments of water stress, accumulation of potassium in height A strongly reduced, so that only 20 percent of treated leaves of a plant K+ accumulation by height A be.

3) Under conditions of water stress, potassium accumulation in leaves of height C, 20 percent of the total amount of potassium accumulated leaves of a plant that was included with more severe stress, especially in treatment, this amounts to 52 percent of the total K accumulated leaves a plant increased the process of transition element Leaves low to high water stress conditions can be completely specified (Figure 1).

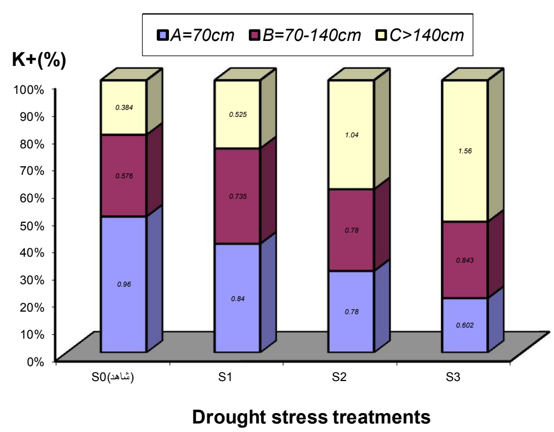


Figure 1. Effect of drought on transfer and accumulation $K^+$

**3.2. Stomat Resistannce**

Analysis of variance showed that at 1% per 3-year experiment, the water stress treatments, two periods of growth and interactions on stomata resistance and lower leaf surfaces separately supernatant was demonstrated. By applying different levels of water stress, stomata resistance and lower leaf surfaces increased supernatant. Duncan test at 5% level on average every 3 years, 3 groups were offered. Treatments S3 (severe water stress treatment) and treated with the highest S0 (control, no water stress) had the lowest stomata resistance. Duncan test at 5% level interactions showed that the treatments $S_{0,\ 1,\ 2}$ Panini had the highest values of stomata resistance. The plant grows in its early stages, when enough water has, from its low stomata resistance will occur. More severe stress applied at $V_2$ growth period a significant increase in stomata resistance. The lower surface of the leaf stomata resistance was much higher than levels in the supernatant.

**4. Discussions**

Stomata resistance in the supernatant and the back surface of the leaves increased with applied stress (Michel 1995). Stomata resistance in leaves increased the leaf area was higher. Stomata resistance in the supernatant levels of growth in the $V_1$ and lower leaf growth periods less than $V_{2,\ 3}$ respectively. According to in the beginning, the stomata physiological did not develop, resulting in little resistance to water stress do not show, but with increasing plant age and development of stomata guard cells, Stomata resistance increases (Jones 1980).

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**References**

1. Jones, H.G. (1980). Interaction and integration of adaptive response to water stress- Royal Soc. London, series B 273: 193- 205.
2. Kasele, I.N., J.F. Shanahan, and D.C. Nielsen. 1995. Impact of growth retardants on corn leaf morphology and gas exchange traits. Crop Sci. 35:190-194.
3. Michel, B.E, (1983). Evaluation of the water potentials of polyethylene glycol 8000 vote in the absence and presence of other solutes. Plant in the apex leaves of what during water stress. Aust. J. Plant physiol. 6:379-389.
4. Slavic, B. (1974). Methods of studying plant water Relations. Springier Overflag, New York.
5. Wilson, J.P., and M.M.Ludlow. (1983). Time trends of solute accumulation and the influence of potassium fertilizer on osmotic adjustment of water stressed leaves of tropical grasses. Aust. J. Plant physiol. 10:52-337.

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