

Growth parameters, nitrogen and sulfur uptake of onion as affected by different nitrogen fertilizers and nitrification inhibitor

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A pot experiment was carried out to evaluate the effect of different nitrogen fertilizers and the addition of a nitrification inhibitor on yield performance, nitrogen and sulfur uptake of onion (*Allium cepa*). The study was conducted on humic sandy soil and consisted of 13 treatments in a randomized complete block design with four replications. Three types of nitrogen fertilizers (urea, ammonium nitrate, ammonium acetate) with two doses (120 kg N/ha, 240 kg N/ha) were applied. Nitrogen fertilizers were incorporated with or without nitrification inhibitor, Nitrapyrin (2-chloro-6-trichloromethyl-pyridine). The treatments were: 1. control; 2. urea (120 kg N/ha), 3. urea (240 kg N/ha), 4. ammonium acetate (120 kg N/ha), 5. ammonium acetate (240 kg N/ha), 6. ammonium nitrate (120 kg N/ha), 7. ammonium nitrate (240 kg N/ha). In treatments 8. to 13. all nitrogen fertilizers were supplemented with Nitrapyrin. All pots were supplied with standard dose of sulfur (40 kg S/ha) as K₂SO₄. Plant growth was monitored for three months. Leaf and bulb weights, size of bulbs and total plant biomass were measured. Nitrogen and sulfur content and uptake of onion also were determined. All of applied nitrogen fertilizers tended to increase the weight of leaves, but significant increasing effects were only measured by higher doses of urea, ammonium acetate and ammonium nitrate (240 kg N/ha) with a combination of Nitrapyrin compared to the control. The weight of bulbs significantly increased in treatments with higher dose of urea and ammonium nitrate (240 kg N/ha) compared to the control. The sizes of bulbs did not change in any treatment. The total plant biomass was the highest in the treatment of urea (240 kg N/ha) supplemented with Nitrapyrin. The urea, ammonium-acetate and ammonium nitrate enhanced the nitrogen content either in leaves, or in bulbs. The highest leaf nitrogen content was measured in the combined treatment of urea (240 kg N/ha) and Nitrapyrin, and the highest bulb nitrogen content was observed in the treatment of urea (240 kg N/ha) without Nitrapyrin. The total nitrogen uptake of onions was highest at a higher dose of urea (240 kg N/ha), either with or without Nitrapyrin application. The nitrification inhibitor enhanced the total nitrogen uptake of plants when Nitrapyrin was combined with ammonium-acetate compared to a single application of ammonium-acetate. The treatments did not influence the sulfur content of onion leaves, but increased the bulb sulfur content in all cases. The highest bulb sulfur content was measured in the treatment of ammonium nitrate (240 kg N/ha) without Nitrapyrin application and in the treatment of ammonium nitrate (120 kg N/ha) with Nitrapyrin application. The highest sulfur uptake by leaves and bulbs was observed in combined treatment of urea (240 kg N/ha) and Nitrapyrin. The treatments influenced the N/S ratio of leaves. The increased dose of all fertilizers slightly increased the ratio of N/S in

leaves and in bulbs compared to values of lower fertilizer dose. The type of fertilizers did not alter these values in leaves, but influenced the bulb N/S ratio. Among lower doses the highest N/S ratio of bulb was obtained when urea was applied, while the combination of nitrification inhibitor with urea decreased the bulb N/S ratio. On the basis of our results it can be concluded, that the highest effect on the yield parameters, and nitrogen and sulfur status of onion was measured in the treatment of urea + Nitrapyrin at a rate of 240 kg N/ha. The combined application of urea (240 kg N/ha dose) with Nitrapyrin caused the highest plant biomass and nitrogen, sulfur uptake by onion. Nitrapyrin decreased the nitrification process of urea so plant could use the nitrogen more effectively.