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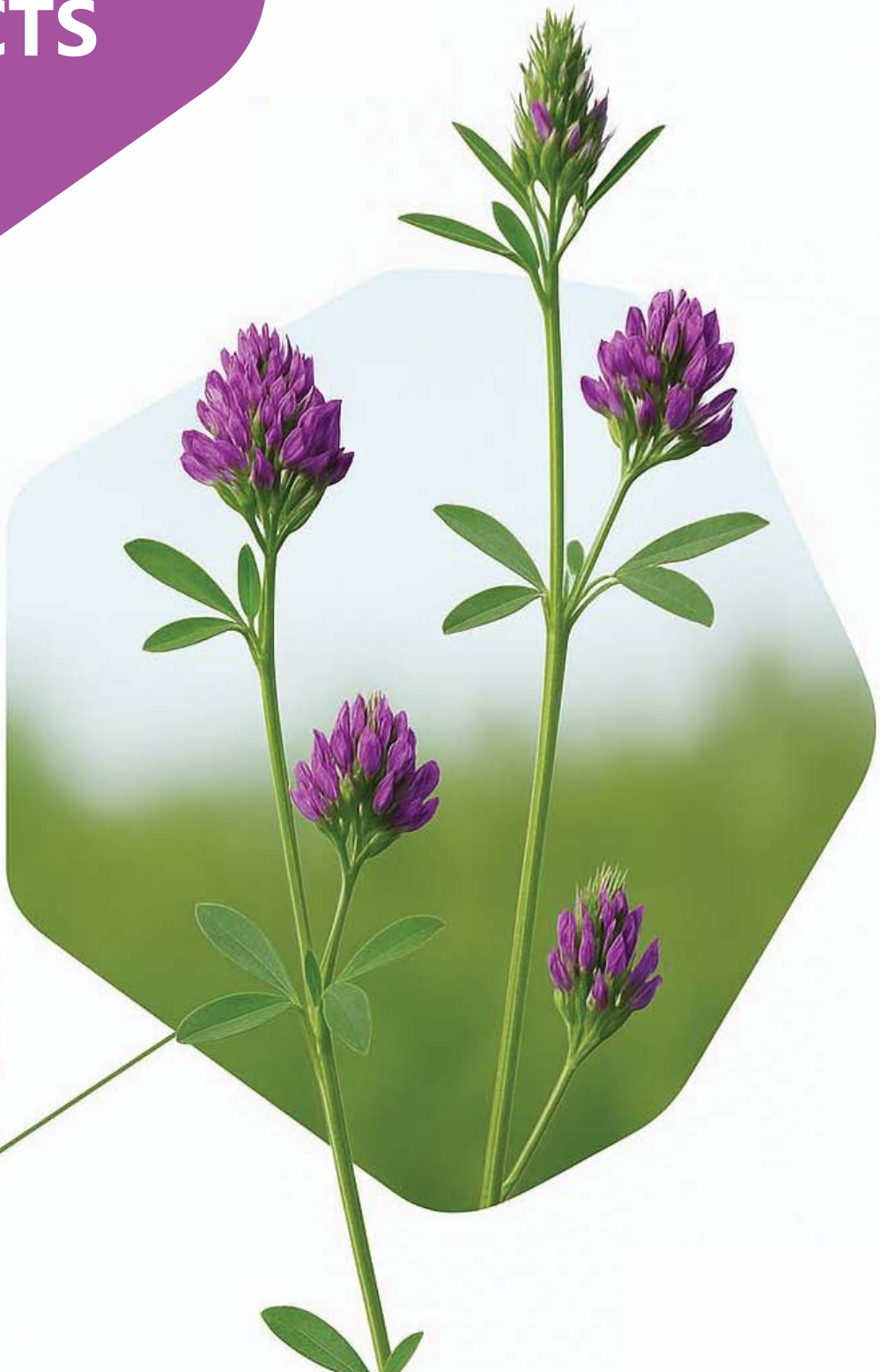
# CONFERENCE ABSTRACTS



FROM 03 TO 06 nov. 2025

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**Long live alfalfa!**

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# ABSTRACTS OF THE 4TH WORLD ALFALFA CONGRESS

**Reims, Marne, France**

November 3 – 6, 2025

- *Poster*

**Aluminum toxicity in alfalfa seedlings: Effects on root growth and antioxidative defense in three cultivars**

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Aluminum toxicity is a major limiting factor for alfalfa (*Medicago sativa* L.) growth in acidic soils (pH<5.5), posing a significant challenge to global agriculture. High concentrations of toxic aluminum ions induce oxidative stress, leading to reduced yield in alfalfa growing regions in the whole world. Toxic effects are manifesting primarily in the root after which affect the development of overall plant tissues. Particularly susceptible are alfalfa seedlings. This study aimed to assess the effect of aluminum toxicity on root growth and biochemistry in seedlings of three alfalfa cultivars (Zuzana, K-28, and O-66). The perfored platform containing seeds was placed put in half-strength Hoagland's nutrient solution (pH 6) for 7 days. After that period, the pH of solution was adjusted to 4.5 and aluminium chloride was added to a final concentration of 100 μM. The response of three alfalfa cultivars to aluminum stress was evaluated after 14 days. The most affected traits were root elongation and lateral root formation in all cultivars, both of which showed the significant decrease in aluminum treatment. The inhibited activity of two antioxidative enzymes, superoxide dismutase (SOD) and ascorbate peroxidase (APX), also occurred in all cultivars. Root length was significantly reduced in all cultivars compared to the control groups, among which O-66 showed the most pronounced reduction. In contrast, cultivars Zuzana and K-28 showed no significant difference from each other but displayed significantly longer roots than cultivar O-66 under aluminum stress. Lateral root formation followed a similar trend, further highlighting the toxic impact of aluminum on root development in all three cultivars. The activity of APX and SOD was significantly reduced in all three cultivars under aluminum treatment. The greatest percentage inhibition of both enzymes was observed in cultivar O-66, indicating a higher sensitivity to aluminum-induced oxidative stress compared to the other two cultivars. Aluminum toxicity significantly decreased root growth and antioxidative enzyme activity in alfalfa seedlings, with cultivar O-66 showing the highest sensitivity. Root elongation and lateral root formation were most reduced in O-66, along with the greatest inhibition of SOD and APX activity. In contrast, Zuzana and K-28 exhibited greater tolerance. These findings highlight the impact of aluminum stress on alfalfa and point to interpopulation variability among these three cultivars.

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