[P1] Field Crop Production

Thu. Sep 9, 2021 12:15 PM - 2:00 PM Room 1 (Poster) (Field Crop Production)

12:15 PM - 1:00 PM

[P1-07]Analysis of the N Uptake Pattern to Improve Increasing Yields of Dry Direct-Seeding Rice in a Cool Climate

*Nominated for Presentation Awards

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Dry direct-seeded rice (DSR) is a promising alternative to reduce labor costs compared to transplanted rice, but its low nitrogen (N) fertilizer use efficiency is one of the constraints to the efficient management of DSR in a cool climate. To explore reasons for low NUE in northern Japan, we examined the N uptake patterns of DSR under three different fertilizer regimes under three environments: two years in Morioka and one in Hanamaki, Iwate Prefecture, Japan. We used two cultivars ('Akitakomachi' and 'Yumiazusa') in Morioka and one ('Moeminori') in Hanamaki. In all N treatments at both sites, N uptake patterns exhibited the initial exponential growth (phase 1) followed by a linear growth (phase 2) as a function of the accumulated effective thermal index (AETI). These patterns are well characterized by four parameters: N uptake at the 5th leaf age (*NLA5*), Relative Nitrogen Uptake Rate (*RNR*) in phase 1, breakpoint AETI at which the pattern shifts from the exponential to linear phase (*Nbreak+a AETI*), and the constant rate of N uptake in phase 2 (*a*). Nitrogen treatments had significant effects on *NLA5*, *RNR* and *a*. Multiple regression analysis revealed that the three parameters had significantly positive effects on grain yield, but *NLA5* and *RNR* had greater effects than *a*. We, therefore, conclude that the N uptake pattern during the exponential growth phase imposes the major limitation to yield. *NLA5* differed between environments suggesting initial growth/soil conditions also play a role in controlling early growth and thus grain yields.