Bioactive compounds from duckweed (*Lemna paucicostata*), can they provide food sustainability against adverse environments

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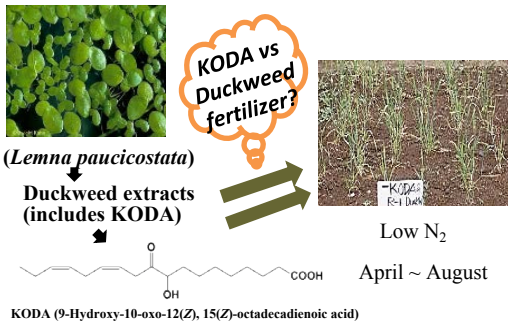
Key message: Overall α-ketol octadecadienoic acid (KODA) - and duck weed fertilizer (DWF) - treatment pushed up approximately 30% greater grain yield under low fertilizer condition at late spring season.

Background and objective:

While KODA was found to involve in enhanced root growth in Japanese wheat cultivar Yumeshiho against alkaline and dry soil (Poster 163 by Ogawa et al.), and its donor plant, duck weed played adaptive role against NH_4^+ toxicity (Wang et al. 2016). KODA enhanced approximately 12% greater crop yield (grain weight) in general under low fertilizer field in late autumn but moderately in early spring sowing season (Poster 145 by Ban et al.). The yield contributing components were different over two growing (Poster 145 by Ban et al.). On the other hand, duckweed powder (hereafter called duckweed fertilizers; DWF) was found to increase rice yield by 10-20% in the two consecutive years (Takagi et al., Unpublished). Interestingly, the yield contributing components between rice and autumn grown wheat overlaps. It was reported that the number of stems and the total number of seeds increased as a result of fertilization after draining the green compost from fermented soil, and DWF treatment. The objective of this study was to see difference on season specific recovery between KODA and DWF in wheat against deficient fertilizer condition. If different, the mechanism is different or same. So, we grew wheat on late spring (April 8) in 2016.

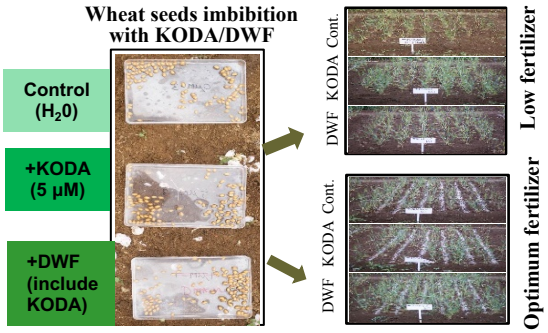


Materials and methods:

We used Japanese breed wheat Yumeshiho conserved in Kihara Institute for Biological Research (KIBR), Yokohama City University.

Seeds were imbibed with 5 µM KODA and DWF containing 5 µM KODA, which were provided by Shiseido Co., Ltd., Japan, for overnight at 20±2 ℃. Eighty four healthy seeds with KODA and DWF or without KODA and DWF treatment were sown on primary yield trial plot (2 m × 1.3 m) in KIBR field. Plant to plant distance was 20 cm and row to row distance was about 20 cm.

The whole plots was divided into two culture condition groups. (A) With optimum fertilizers and (B) With low fertilizers. For (A), we have applied fertilizers thrice with the following N_2 concentration: 48 kg/hectare before sowing, 60 kg/hectare at one month (May 8) after sowing and 40 kg/hectare at 45 days (May 23) after sowing. On the other hand, for (B), after plowing (48 kg/hectare) no fertilizers were applied.

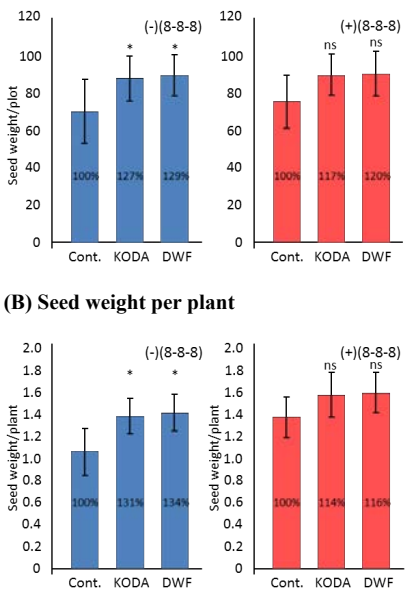


Results:

◎ **Greater seed weight: DWF>KODA>Control**

◎ **Greater germination: KODA>DWF>Control**
Physiological activities: DWF>KODA>Control

◎ **Greater yield component: DWF>KODA>Control and possible mode of KODA or DWF action for late spring sowing**



Cont., control, Values are means ± SE (n = 2). Asterisks indicates significant differences at the 5% level by analysis of variance, respectively. ns, non-significant