

(Form No. 14)

ABSTRACT OF DOCTORAL THESIS

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Title: *Leymus racemosus*, a wheat wild relative is a potential source for wheat

Improvement for aluminum and heat stress tolerance

(コムギの近縁種、オオハマニンニクはコムギのアルミニウムおよび高温耐性を改良するための潜在的資源である)

Aluminum (Al) toxicity and heat stress limit wheat production in arable land and in about 70% of the potential arable land. Breeding tolerant cultivars is the efficient mean to mitigate the problem. In this study 15 wheat-*Leymus racemosus* chromosome addition lines (CAL) were evaluated in hydroponic culture at various Al concentrations, and in a growth chamber and in a field in two heat-stressed environments in Sudan to identify new genetic resources to improve wheat tolerance to Al and heat stress. CAL A and E showed enhanced Al tolerance. The improved tolerance of E was attributing to improved cell membrane integrity. Under heat stress, I and O CAL showed high heat tolerance. I and N CAL showed a large number of kernels per spike, while Q CAL possessed high yield potential. Grain yield was correlated negatively with the heat susceptibility index, days to heading and maturity, and positively with kernel number per spike and triphenyl tetrazolium chloride assay under heat stress. The results suggest that these genetic stocks could be used as a bridge to introduce the valuable *Leymus* traits into a superior wheat genetic background, thus helping maximize wheat yield in Al and heat-stressed environments.

Note: some of the figures, etc., have been omitted.”