

積儲強度對水稻抽穗後同化物質生產與分配的影響

林忠毅; 陳治官; 林俊隆

中文摘要

本研究之目的在探討水稻抽穗後穗部積儲的減少，對碳素及氮素同化物質的生產，以及這些同化物質在各器官分配型式的影響。於 1987 年第二期作與 1988 年第一期作，以臺農 67 號、臺中私 2 號以及彼等之細胞質雄不稔 (WA 型) 近同源基因係進行試驗。同時於 1989 年第二期作，以臺農 67 號及其雄不稔近同源基因系，在水泥試驗槽中進行光合作用能力的比較，以探討雄不稔或剪穎對葉片供源能力的影響。試驗結果顯示部論是因雄不稔或剪穎處理所造成之穗部積儲的減少，均未降低供源葉片 (劍葉及其下一葉) 的光合作用。至於氮素，不論雄稔或雄不稔植株在抽穗之後，其同化能力似均趨於停止；故兩者之全氮含量并明顯的差異。在碳素方面，雄稔或雄不稔植株在抽穗後最初的兩週內，TNC 含量均不再增加；唯此後由於雄不稔質豬所生出的新生分蘗之旺盛生長，因而其 TNC 含量不再增加。就碳素和氮素同化物質的分配而言，雄稔植株已發育中的穀粒為其主要積儲，而雄不稔或剪穎則以莖稈及新生分蘗為其替代的積儲器官。試驗結果建議，水稻穗部積儲的減少，只會影響同化物質分配的型式，而不會影響同化物質的生產能力。

關鍵字：水稻；雄不稔近同源基因系；供源--積儲；非結構性碳水化合物；全氮

Abstract

The purpose of this study was to investigate the post-heading assimilation and distribution of carbohydrate and nitrogen in rice plants as influenced by reduced sink demand through spikelet removal or male sterility. Field experiments were conducted in the 2nd crop of 1987 and 1st crop of 1988 by using cultivars Tainung No. 67 (TNG67) and Taichung Sen No.2 (TCS2) and their cytoplasmic male sterile near-isogenic lines (TNC 67A and TCS2A) as materials. TNG 67 was also cultured in paddy tanks in the 2nd crop of 1989 to study the effect of panicle clipping on photosynthesis of the source leaves. Experimental results revealed that the reduction of panicle sink, either by male sterility or spikelet clipping, showed no significant effects on the photosynthesis of the uppermost two leaves. The total N content remained relatively stable or decreased during the course of grain-filling in both the fertile and sterile plants. No significant difference in total N content was observed between the fertile and sterile plants. Both the fertile and sterile plants accumulated total nonstructural carbohydrates (TNC) at about the same rate during the first two weeks after heading. However, the accumulation of TNC ceased in the sterile plants thereafter because of the vigorous growth of the young tillers emerged after heading. The developing grain were the major sink in the fertile plants, whereas stem, leaf sheath and the newly-emerged young tillers were the alternative sinks in the plants with either male sterility or spikelet-clipping. It was concluded that under the current experimental conditions, reduction in sink demand of rice plants could induce a drastic change in the pattern of assimilate partitioning rather than the inhibition of assimilate production.

Key words : Rice(*Oryza sativa* L.); Cytoplasmic male sterility; Source-sink;
Total nonstructural carbohydrates; Total N