

## Non-Structural Carbohydrates and Nitrogen Contents in Growing Red-pepper Plants under Different Nitrogen Sources

Jwa-Kyung Sung<sup>1\*</sup>, Sang-Min Lee<sup>1)</sup>, Yong-Hwan Lee<sup>1)</sup>, Su-Yeon Lee<sup>2)</sup>, So-Hyeon Park<sup>1)</sup>, Young-Ho Kim<sup>1)</sup>, Du-Hoi Choi<sup>1)</sup>, Beom-Heon Song<sup>3)</sup>

<sup>1)</sup>National Institute of Agricultural Science and Technology, RDA, Suwon, Korea

<sup>2)</sup>Dept. of Plant Resources and Science, Hankyong National University, Anseong, Korea

<sup>3)</sup>Dept. of Agronomy, Chungbuk National University, Cheongju, Korea

### Objectives

The aim of this experiment is to examine time-course changes in non structural carbohydrate contents and nitrogen utilization in shoots and roots of red pepper plants under different fertilization conditions.

### Materials and Methods

- Green manure crops : hairy vetch, rye
  - sowing (8kg 10a<sup>-1</sup>, October, 2004), harvesting (May, 2005)
- Main crop : red pepper, transplanting (May, 2005)
- Treatment : Non-fertilization (control), chemical fertilizer, hairy vetch and rye
  - N and K as chemical fertilizer were applied at 15.8 and 12.2kg 10a<sup>-1</sup>.
  - The residues of hairy vetch and rye were directly re-used as organic fertilizer.
- Sampling : plants were randomly collected from each treatment.
- Analysis
  - Non-structural carbohydrate : Yoshida method (ethanol soluble sugar and starch)
  - Nitrate contents : Cataldo method

### Results and Discussion

○ Significant differences were found in the concentration of leaves at 10 DAT (Fig. 1). An application of chemical fertilizer or hairy vetch residues including high rates of nitrogen compounds increased the NO<sub>3</sub> levels in the leaves. Continuous growth of red pepper plants slightly decreased nitrate due to the utilization to produce various organic N-compounds.

○ Total nitrogen and non-structural carbohydrates in plants proved to be a significant relation (Fig. 1, Table 1). A depletion of nitrogen contents in leaves and roots induced the increase in carbohydrate contents. Soluble sugars couldn't find obvious difference among treatments, however, starch contents in red pepper plants applied green manure residues remained to be high levels, compared to chemical fertilizer.

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\* Corresponding author:(Phone) 031-290-0551 (E-mail) jksung@rda.go.kr

Fig. 1. Accumulation of  $\text{NO}_3$  in leaves and roots of red pepper plants under differently fertilized soil conditions.

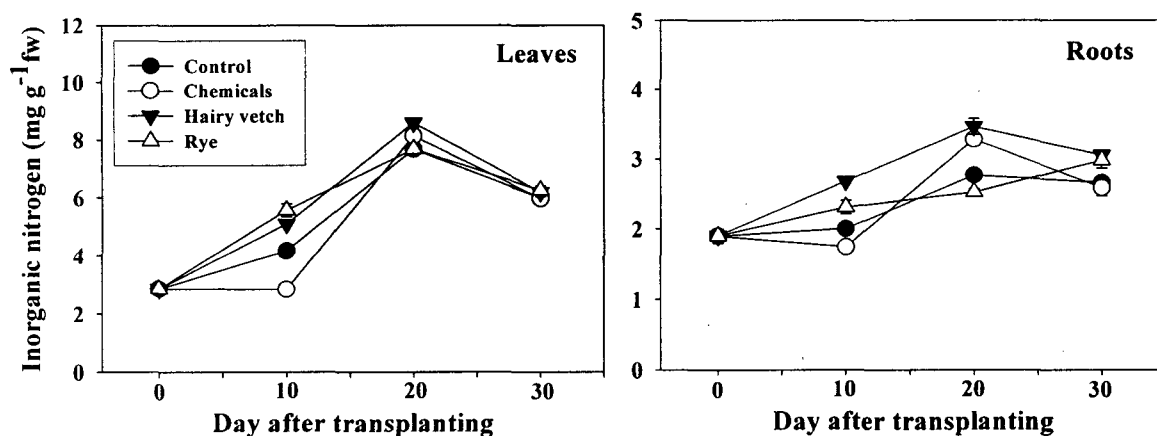


Fig. 2. Changes in the concentrations of total nitrogen in leaves and roots of red pepper plants

Table 1. Non-structural carbohydrates in leaves and roots of red pepper plants under differently fertilized soil conditions

Treatment	Part	0 DAT		10 DAT		20 DAT		30 DAT	
		Sugar	Starch	Sugar	Starch	Sugar	Starch	Sugar	Starch
Control	Leaf	10.0±0.4	35.5±1.0	10.8±0.2	21.8±0.6	5.6±0.3	5.5±0.1	9.9±0.1	7.7±0.1
	Root	11.3±0.3	6.3±0.1	3.3±0.2	3.1±0.1	1.5±0.1	1.4±0.1	2.5±0.1	2.1±0.1
Chemicals	Leaf	-	-	11.9±0.5	22.0±0.1	7.0±0.2	8.4±0.2	9.4±0.2	11.6±0.2
	Root	-	-	2.3±0.1	1.5±0.1	1.2±0.1	1.2±0.1	2.9±0.1	2.1±0.1
Hairy vetch	Leaf	-	-	11.1±0.3	27.9±1.7	6.7±0.2	15.5±0.1	8.4±0.3	14.3±0.4
	Root	-	-	2.5±0.2	2.4±0.1	3.1±0.1	0.9±0.1	4.4±0.1	2.2±0.1
Rye	Leaf	-	-	11.7±0.4	32.7±1.6	6.1±0.5	11.1±0.3	8.2±0.1	12.8±1.4
	Root	-	-	3.2±0.1	4.8±0.1	1.1±0.1	1.1±0.1	2.2±0.1	2.1±0.1