

Red Pepper Cultivation Using a Native Legume Cover Crop in Korea

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Abstract

Four seed vetch (*Vicia tetrasperma*), a biennial native leguminous plant, was used for a cover crop with different quantity of sowed seeds. Weed suppression and yield were evaluated for the red pepper cultivation in the following year of the vetch seeding. Seeding of 1.0, 2.0, 3.0, 4.5, and 6.0 kg 10 a⁻¹ suppressed weed occurrences until late in the growing season of the red pepper. Consequently, red pepper in the cover cropping system with seeding of 3.0, 4.5, and 6.0 kg 10 a⁻¹ had a similar yield to the conventional red pepper. The ideal seed rate in four seed vetch was 3.0 and 4.5 kg 10 a⁻¹ in terms of reducing weed occurrence as well as increasing growth and yield in red pepper.

Introduction

Biennial native leguminous plants have been used as a winter cover crop in Korea. Four seed vetch belongs to the leguminous *Vicia spp.*, grows approximately 50 cm long in a height, spreads throughout Korea, and can be used for a suitable cover crop due to its withering under the hot temperature in summer when cash crops are actively growing (Cho *et al*, 2009). In this research, we verified the potential of four seed vetch to be used cover crop during the following period, in terms of weed suppression and red pepper establishment.

Materials and methods

This study was conducted on the Experimental Farm of National Academy of Agricultural Science in Suwon, Korea in September of 2007 to 2008. Before the four seed vetch was seeded, there were shallow tillage and preparing furrows in September 6 of 2007. Seed rate was 1.0, 2.0, 3.0, 4.5, and 6.0 kg 10 a⁻¹, and the seeding was arranged with three replicates in a randomized block design. Red pepper was transplanted in May 20 of the following year. Uncropped strips and PE mulch were refereed as a control and conventional treatments, respectively. Coverage rate was visually observed at the time of seeding of four seed vetch (Oct 19 of 2007), pre-transplanting of red pepper (May 15 of 2008), and post-transplanting of red pepper (June, July, and August 20 of 2008). Weed weight was counted on July 20 of 2008, and growth and yield in red pepper were measured after harvesting.

Results and Discussion

Four seed vetch with seed rate of 3.0, 4.5, and 6.0 kg 10 a⁻¹ covered ground more than 70% before winter in 2007 and showed most coverage on the ground in May of 2008 when the red pepper was transplanted (Table 1). Consequently, weed

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suppression more than 90% was observed on the cover cropping system with seed rate of 3.0, 4.5, and 6.0 kg 10 a⁻¹ in 60 days after transplanting (Table 2), resulting in taller height, thicker diameter, and higher yield in red pepper compared with those of control or similar to the conventional red pepper (Table 3). Hairy vetch, one of the main cover crops in Korea, overcomes the cold weather and provides large amounts of organic mulches, which has been used for a green manure (Seo *et al*, 2005). Several cuts or early dead of the winter cover crop (four seed vetch) reduced the potential competition with the pepper for the availability of water and nutrients (Hollander *et al*, 2007) as well as provided nutrients for the red pepper establishment and growth since the growing period between the two plants were not overlapped.

Tab. 1: Coverage rate as affected by seeding rate of four seed vetch in a red pepper field in 2007

Seeding rate (kg 10 a ⁻¹)	Coverage rate (%)				
	Oct. 19 2007	May 15 2008	June 20 2008	July 20 2008	Aug. 20 2008
1.0	16.6	40.7	37.1	11.8	6.9
2.0	31.8	69.5	54.2	34.3	19.3
3.0	69.9	85.5	87.8	78.3	62.0
4.5	70.5	97.9	95.7	84.9	68.7
6.0	80.9	97.8	97.9	93.1	78.1

Tab. 2: Number and fresh weight of weed and weeding as affected by seeding rate of four seed vetch in a red pepper field in July 20 of 2008

Seeding rate (kg 10 a ⁻¹)	No of pl m ⁻²	Fresh weight (g m ⁻²)	Weed control rate (%)
1.0	61.2	1,604	49.7
2.0	66.7	1,359	57.4
3.0	12.5	225	92.3
4.5	11.3	88	97.2
6.0	9.6	62	98.1
Uncropped strips	102.9	3,191	-

Tab. 3: Growth and yield of red pepper as affected by seeding rate of four seed vetch in a red pepper field in 2008

Seeding rate (kg 10 a ⁻¹)	Plant height (cm)	Diameter (mm)	Yield (kg 10 a ⁻¹)
1.0	96.6	12.2	148.3 b*
2.0	100.1	13.8	186.5 b
3.0	106.1	13.3	292.8 a
4.5	103.7	13.6	274.8 a
6.0	100.1	14.1	264.0 a
Uncropped strips	75.9	8.3	36.9 c
PE film mulch	101.7	15.7	308.9 a

* : 0.05 DMRT

Conclusions

We observed that four seed vetch, biennial native legume, have been shown as a sustainable approach which enables us to control weeds better and to obtain a high pepper production as observed by Guldan and Martin(1996).

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