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Impact of Different Weed Management Practices in Commercial Vegetable Crops under Western Himalayan Agro-Climatic Zone of Jammu and Kashmir

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Abstract: This paper will give some suggestion for suitable the Weed Management Practices in Commercial Vegetable crops under Western Himalayan Agro-Climatic Zone of Jammu and Kashmir" Although agriculture is the main occupation of Jammu and Kashmir, But they are still traditional minded in weed management Practices. Weeds are costly. They compete with vegetable crops for water, fertilizer, and light, and they often reduce yield and quality. They increase labor and equipment costs, harbor insect and disease organisms, and reduce land values. Economic and environmental considerations mean we must adopt more long-term approaches to weed management in Commercial vegetable production.

Keywords: BIOSCAPE,

I. INTRODUCTION

India is the second largest producer of Vegetables after China; however, there is great need for further increase in vegetable production to meet the basic requirement. Inspite of various recent technologies of vegetable production, there is wide gap between the experimental yield and actual yield on the farmer's fields. Weeds constitute a major factor limiting successful cultivation of these crops. They compete with crops for water, nutrients, light and space, causing losses (10 to 90%) in yield and deteriorate the quality of vegetables. Vegetables crops are found infested with a number of weed species including grassy, non-grassy and sedges. The vegetative growth of weeds is so fast those they completely cover crop plants if not weeded at proper stage, particularly during rainy season. In general, critical period of crop-weed competition in vegetables has been observed between 15-60 days after sowing/transplanting. Most vegetables are initially slow growing crops, incapable of offering any competition to the aggressive weeds. Root vegetables are malformed in the presence of weeds because of underground competition for space. Insanitation due to weeds also increases burden of insect pests and diseases in vegetables.

The main problem is usually annual weeds within the row. The weeds between the rows can normally be controlled with some kind of mechanical row cultivation. The solution to the weed problem is not only to find rational methods to kill the weeds when they show up in the crop, but also to find suitable preventive measures and modifications of the cultivation technique.

Since it is difficult to control the weeds after crop emergence, emphasis must be put on preventing the weeds from emerging in the crop. This involves different methods of reducing the soil seed bank by avoiding dissemination of weed seeds in all crops in the crop rotation, and to control weeds effectively before and after the crops.

II. STRATEGY

Main methods can be used individually or in different combinations to control weeds in vegetable crops:

1. **Agronomic Manipulations**
   Crop stand, Stale seed bed, Planting method, smothering, crop rotation, etc.
2. **Physical Methods**
   Hand weeding, tillage/harrowing, solarization, reduction of soil seed bank, etc.
3. **Biological Control**
4. **Chemical Control**

Research and development are suggested to be emphasized on preventive measures, new cultivation methods, and equipment for weed control very close to the row and within the row.

1. Agronomic Manipulations

The vegetable crop does not need to be weed-free during the whole growing season. For many crops there is a so called "critical period", during which the presence of weeds has the strongest effect on crop yield. The critical period is different for different crops. For many crops this period starts some weeks after crop-emergence and end sometime during the first half of the growing period.

However the critical period does not mean that the weeds can develop freely after the critical period. Weeds at the end of the season often affect product quality and cause problems during harvesting. However, the importance of the weeds depends on the crop and the weeds species. In crops like cabbage that are harvested by hand weeds with a creeping growth is of minor importance.

Another good reason to keep control of the weeds throughout the season is to avoid building up of the seed bank. If the weeds are allowed to disseminate seeds, it also means future problems with weeds in subsequent crops, confirming the English proverb "One year seeding means seven years weeding". However, in vegetable crops the negative effects of the weeds usually seem to be of major importance.

Stale seed bed

By delayed sowing several weeds can be killed before sowing and crop emergence. Planting instead of seeding, when possible, is another way of reducing the weed problems

Method of sowing

By transplanting the crop instead of direct drilling on the field, the weed problems are considerably reduced. Many crops, for example cabbage, lettuce and leeks are already used as transplants to a great extent. There is also a growing interest for transplanting onions but the high costs for seedlings and transplanting are the major problem today.

Crop rotation

One of the best preventive measures is a sound crop rotation, which does not favour the building up of weeds. The ideal situation is a crop rotation which includes perennial crops, such as pasture or green manuring.

The use of fallow is often a necessary evil in organic farming to control weeds. In order to avoid negative effects such as damaging soil structure and causing leakage, green manuring may serve as interesting alternatives.

2. Physical Methods

Hand-weeding

The weeds cause expensive and laborious hand-weeding, in carrots normally somewhere between 100-300 man-hours per hectare. The weed problems are most severe in early sown crops with slow earl development, e.g. root crops and onions. The main problem is usually annual weeds within the row. Perennial weeds may also cause problems but can more easily be controlled mechanically between the crops.

The hand-weeding is mainly a problem of getting labour rather than a economical problem. At least in Sweden, the additional price for alternatively grown products well includes the extra costs for hand-weeding.

Mechanical and thermal control inputs are important control methods which reduce the need for hand weeding. However, harrowing, row cultivation and flaming, as they are used today, all have one thing in common; they only have a short term effect and in general they can not control the weeds in the row we enough.

The problems are not as severe in all vegetable crops though. For example, in planted *Brassica* crops and lettuce, the crop competes much better with the weeds compared with root crops. In a few crops such as potatoes, maize and set onions, all or most of the weeds can be managed without hand-weeding by means of mechanical and thermal methods.

Reduce the soil seed bank

Since it is difficult to control the weeds in the row after crop emergence, emphasis has to but on avoiding the weeds to emerge in the crop. This involves different methods of reducing the soil seed bank by avoiding dissemination of weed seeds in all crops. This means that there are reasons to be more careful with the weed control in the agricultural crops if vegetables are grown in the crop rotation. It also means that it is even more important to control weeds effectively before and after the crop.

The seed bank is of considerable importance since it represents the potential weed flora and the weed problems of the future. Very large number of viable seeds are usually present in arable soils, often somewhere in the range of 5,000 to 50,000 seeds/m2, but there are also fields where you find less than 500 and up to 500,000 seeds/m^2.Vegetable cropping favours weed species which require only a comparatively short interval between emergence and the start of seed production, and whose seeds can germinate over a wide temperature range. Intensive vegetable production therefore often results in large seed populations of a few species, among them *Stellaria media*, *Poa annua, Urtica urens, Senecio vulgaris* and *Chenopodium album.*

Solarization

The technique of soil solarization involves covering the soil with transparent, polyethylene film during the hottest part of the summer months, for 2-4 weeks. Thus temperature rise by 10-12 0C over the unfilmed fields, which is sufficient to kill weed seeds present on the surface of the soil.

Harrowing (Tillage)

In some crops and in some situations harrowing is interesting pre-emergence and in the early stages of the crop. Shallow harrowing can be done pre-emergence in, for example, carrots, onions, beans and peas. Harrowing has a selective effect and can therefore under certain conditions be used after crop emergence also. In a young weed stage weed harrows can sometimes be used in, for example, potatoes, beets, set onions, maize and cabbage, as long as the crop plants are firmly anchored in the soil. Research is going on at the moment on harrowing in more sensitive crops like carrots and seeded onions. Harrowing is very dependent on dry soil conditions and pre-emergence harrowing involves a greater risk for crop damage than flaming. However, with both flaming and harrowing it is often advisable to raise the seed amount to some degree to afford some plant reduction when treating.

Inter-row cultivation has to be done repeatedly during the growing season. Especially during the early cultivations it is very important to get close to the row. If the row cultivation leaves a strip of only 6 cm instead of, say, 10-12 cm you

save a lot of labour requirement for hand weeding. With an implement with low side pressure, like the multiple row brush hoe, it is possible to cultivate very close to the row without damaging the plants. There are, for example, reports on successful treatments with only 4-5 cm wide protecting tunnels.

3. Biological Method

Biological method of weed control in vegetable crops has still long way to go. However bio herbicides are coming up for future use effectively. In this approach certain fungal preparations are used

BIOSCAPE (USA) is excited to offer BIO-WEED, a 100% organic pre-emergent weed suppressor and slow release fertilizer. BIO-WEED can reduce crabgrass by up to 98% and is fantastic for suppressing many other weeds from germinating.

Non-selective organic pre-emergence herbicide and slow release organic fertilizer for the control of broadleaf weeds, and annual and perennial grasses. BIO-WEED is formulated for use in general agriculture, organic farms, commercial and residential landscapes, parks, school grounds (including play grounds), golf courses, greenhouses, nurseries, all types of tree farms, right-of-ways (including but not limited to ditches, canals, roadsides, easements, open space areas, etc.) and riparian and other natural areas.

BIO-WEED can be used in and around flower, vegetable and herb gardens and crops, perennial plants, annual and perennial bulbs, turf grasses, citrus, fruit and nut trees, ornamental trees and shrubs, rose gardens, and virtually any woody and herbaceous plant.

4. Chemical Control

Chemical control of weeds in vegetable farming is relatively new. Still, quite a few herbicides are made available for weeding vegetables, but unfortunately, no single herbicide controls all the weed species that may plague a vegetable field.

Herbicides control weeds effectively up to 4-5 weeks period, by the time majority of vegetables develop sufficient canopy and provide smothering effects on weeds. A list of herbicides recommended for various vegetables is given in Table 1.

Table 1: List of herbicides recommended for various vegetable crops.

Crop	**Herbicides**		**Rate of application kg ai /ha**	**Time of application**	**Types of weeds controlled**
	Common name	Trade name			
Okra	Fluchloralin	Basalin	1-1.5+ HW 45 DAS	PPI	AG,BL
	Pendimethalin	Stomp	1-1.5+ HW 45 DAS	PE	AG,BL
	Alachlor	Lasso	2-2.5	PE	AG,BL
	Trifluralin	Treflan	1.0	PPI	AG,BL
	Ofyfluoren	Goal	0.1-0.2	PE	AG,BL
Brinjal	Alachlor	Lasso	2.0+ HW 45 DAT	PE	AG,BL
	Pendimethalin	Stomp	1.0+ HW 45 DAT	PE	AG,BL
	Oxadiazon	Ronstar	1.0	PE	AG,BL
	Oxyfluorfen	Goal	0.125-0.25	PE	AG,BL
	Fluchloralin	Basalin	1.0-1.25	PPI	AG,BL
Chillies & Capsicum	Oxyfluorfen	Goal	0.1-0.2	PE	AG,BL
	Pendimethalin	Stomp	1.0-1.5	PE	AG,BL
	Oxadiazon	Rontar	1.0	PE	AG,BL
	Fluchloralin	Basalin	1.25	PPI	AG,BL
Cole crops	Alachlor	Lasso	2.5+ HW 45 DAT	PE	AG,BL
	Trifuralin	Treflan	1.0-1.5	PPI	AG,BL
	Oxyfluorfen	Goal	0.1-0.25	PE	AG,BL
	Pendimethalin	Stomp	1.0	PE	AG,BL
Tomato & Potato	Metribuzin	Sencor	0.5-1.0	PE,POE	AG,BL,NS
	Pendimethalin	Stomp	1.0-1.5	PE	AG,BL
	Trifluralin	Treflan	20.-3.0	PPI	AG,BL,NS
	Fluchloralin	Basalin	1.0-1.25	PPI	AG,BL
	Alachlor	Lasso	1.0-2.0	PE	AG,BL
	Oxyfluorfen	Goal	0.15-0.25	PE	AG,BL
	Oxadiazon	Ronstar	1.0	PE	AG,BL

Peas	Alachlor	Lasso	0.75+ HW 45 DAS	PE	AG,BL
	Fluchloralin	Basalin	1.0	PPI	AG,BL
	Pendimethalin	Stomp	1.0-1.5	PE	AG,BL
Onion	Alachlor	Lasso	1.0-1.5	PE	AG,BL
	Pendimethalin	Stomp	1.0-1.5	PE	AG,BL
	Fluchloralin	Basalin	1.0+ 1 HW, 45 DAT	PPI	AG,BL
	Oxadiazone	Ronstar	1.0-1.5	PE	AG,BL
	Oxyfluorfen	Goal	0.15-0.2	PE	AG,BL
Coriander	Pendimethalin	Stomp	1.0	PE	AG,BL
Beans	Fluchloralin	Basalin	1.0-1.5	PPI	AG,BL
	Pendimethalin	Stomp	1.0-1.5	PE	AG,BL
	Alachlor	Lasso	2.0-2.5	PE	AG,BL
Root crops	Oxyfluorfen	Goal	0.2	PE	AG,BL

PE – Pre-emergence, POE - Post-emergence, PPI – Pre-plant incorporation, AG – Annual grasses, BL – Broad leaf weeds, NS – Nut sedges, DAT – Days after transplanting, DAS – Days after sowing

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