

An Assessment of Phosphamidon Residues on Mustard Crop in an Agricultural Field in Bikaner, Rajasthan (India)

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Abstract: Mustard / rapeseed cultivation is done widely throughout India. As all other crops this crop is also attacked by a number of insect pests. Being a cash crop, to protect it against pest infestation, insecticides are sprayed on it, one of them being Phosphamidon. The present study was undertaken to evaluate the persistence of phosphamidon on mustard crop (foliage and siliqua) and soil in an agricultural field in Bikaner (28°N latitude and 73°18'E longitudes), Rajasthan, India. The crop was sprayed with 0.05% phosphamidon @ 700 litre/ha before flowering and 15 days after flowering. For the study samples of soil were taken on 0, 5, 10, 15, 20, 27 days, while, for foliage the samples were collected on 0, 1, 5, 10, 12, 15 days after first day and, siliqua fruits at same intervals as that of foliage after second spray. The analysis was done following the method given by Getz and Walt (1964) as modified by Jain et al. (1974). The initial deposit of phosphamidon was found to be 0.60 mg kg⁻¹ of soil just after the spray, which gradually decreased with time and became non-detectable on the 27th day after spraying. The analytical results pertaining to residues on foliage and siliqua were found to be 10.83 mg kg⁻¹ and 8.53 mg kg⁻¹ respectively after first and second spray and which declined to 0.25 and 0.31 mg kg⁻¹ respectively after 15 days of spraying.

Key words: Phosphamidon • Mustard • Residues • Foliage • Siliqua

INTRODUCTION

Mustard / Rapeseed cultivation is done widely throughout India. India produces around 7 million tones of rape/mustard annually and occupies 3rd position in the list of rapeseed / mustard producing countries contributing about 11% of the world's total production. It is produced in states of Rajasthan, Uttar Pradesh, Haryana, Punjab, Gujarat, Madhya Pradesh, Jammu and Kashmir, West Bengal, Punjab, Assam, Bihar, Himachal Pradesh and Orissa. Mustard is a major cash crop in India, accounting for almost 65% of the total Rabi produce. Rajasthan and Uttar Pradesh account for majority share, contributing to over 50% of the total Indian produce. These areas also have maximum area under cultivation for this crop.

It is basically a winter crop and requires a temperate climate to prosper. The planting season or the sowing period in India is the Rabi season i.e. October to November. The harvesting period is from February to March. It needs the right proportion of rainfall that is provided by the monsoon during the sowing seasons of the crop. The rapeseed/mustard crop acts as a very good cover of soil in winters. The greens including leaves and

stem of mustard are used as vegetables, edible oil from the seeds is extracted and seed cake is used as animal food. As all other crops this crop is also attacked by a number of insect pests. Being a cash crop, to protect it against pest infestation, insecticides are sprayed on it, one of them being Phosphamidon. The present study was undertaken to evaluate the persistence of phosphamidon on mustard crop (foliage and siliqua) and soil in an agricultural field in Bikaner (28°N latitude and 73°18'E longitudes), Rajasthan, India.

The crop was sprayed with 0.05% phosphamidon @ 700 litre/ha before flowering and 15 days after flowering. For the study samples of soil were taken on 0,5,10,1,20,27 days, while, for foliage the samples were collected on 0, 1, 5,10,12,15 days after first day and, siliqua fruits at same intervals as that of foliage after second spray. The analysis was done following the method given by Getz and Watt [1] as modified by Jain *et al.* [2].

The phosphamidon residues in soil obtained at different time intervals are represented in Table 1. The initial deposit was found to be 0.60 mg kg⁻¹ of soil just after the spray, which gradually decreased with time and became non-detectable on the 27th day after spraying (Fig.2).

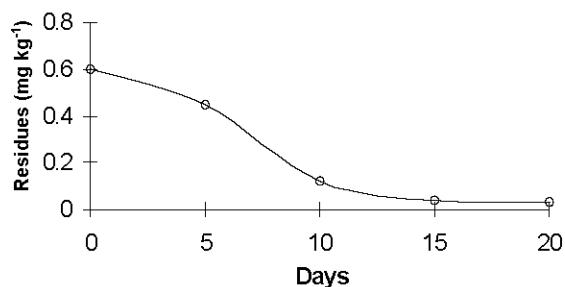


Fig. 1: Phosphamidon residues in soil

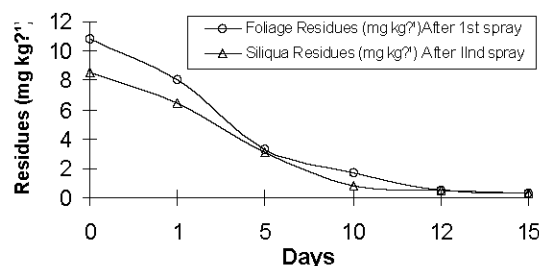


Fig. 2: Phosphamidon residues on mustard foliage and siliqua after I and II spraying

Table 1: Phosphamidon residues in soil

Days after application	Residues (mg kg ⁻¹)	% Reduction
0	0.60	-
5	0.45	25
10	0.12	80
15	0.04	93.33
20	0.03	95
27	N.D	100

Table 2: Phosphamidon residues on mustard foliage and siliqua after first and second spraying

Days after spraying	Foliage Residues (mg kg ⁻¹) after 1 st spray	% Reduction	Siliqua Residues (mg kg ⁻¹) after 2 nd spray	% Reduction
0	10.83	-	8.53	-
1	8.02	24.5	6.44	25.95
5	3.32	64.13	3.06	69.34
10	1.66	90.39	0.82	84.67
12	0.53	93.67	0.54	95.11
15	0.25	96.37	0.31	97.69

Table 2 shows the analytical results pertaining to residues on foliage and siliqua which were found to be 10.83 mg kg⁻¹ and 8.53 mg kg⁻¹ respectively after first and second spray and which declined to 0.25 mg kg⁻¹ and 0.31 mg kg⁻¹ respectively after 15 days of spraying (Fig. 1).

On the basis of tolerance limit of 0.5 mg kg⁻¹ for phosphamidon as assigned by FAO/WHO [3] the results show that the residues which persist till the 12th day after application are more than the prescribed limits and their consumption could be harmful. According to Chakrobarty and Sukul [4] simple washing and cooking of the zero day foliage samples resulted in 70.6 and 86.8 per cent reduction of the pesticide but during the present study even if this fact is considered the reduction would still be more than the tolerance limit laid down by FAO/WHO [3]. The rate of dissipation of phosphamidon residues from second spray treatment followed a trend almost similar to that seen after first spray. The residues found in siliqua were less due to smaller surface area of the fruits

as compared to that of leaves. This is in conformation with the earlier reports of Hoeringer and Kenanga [5] who also suggested that the higher level of residues on leaves than in siliqua could be due to greater surface/mass of the former as well as greater interception of the spray. It is evident from the present study that the persistence of phosphamidon on mustard foliage may be recorded until the 12th day after spraying rendering it unfit for human consumption.

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