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Determination of Granulating Diazinon Insecticide Remaining in high yielding cultivars Rice Grainin Eastern Mazandaran of Iran

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Abstract

To evaluate the diazinon remaining, 36 samples of rice at deferent stages of cultivation, harvesting and storage in the ware house, after spraying by diazinon insecticide,inAmol,Mahmudabad, Fereydunkenar (East ofMazandaran province), selected and studied. The highest measured levels of diazinon after spraying in August before the harvest were 1/58 , 1/6, 1/8ppm in 2011and 1.55,1.52,1.75 in 2012 at high yielding cultivars in cities mentioned in the East ofMazandaran province were reported. The lowest measured concentrations of the insecticide after twomonths of harvest were ,0/34 ppm in 2011 at Amol and0/37 ppm at Fereydunkenarin high yielding cultivars.The remaining of Diazinonpoison in high yielding cultivars samples of rice until twomonths after harvest were higher than permissible limit at Amol,Mahmudabad and Fereydunkenar. Also, based on thebiennialaverage in high yielding cultivars samples after three and Sixmonths from the time of harvest, there was no trace of diazinon atstudied regions in the east of Mazandaran province.

Keywords: phosphorous insecticide, Diazinon, remaining, rice, high yielding cultivars

Introduction

Environmental pollution is one of the serious predicaments of the modern world(Hosseinabadi 2014). The growing population and increasing needs to agricultural productsincreased use of pesticides resulting in contamination of the environment, including agricultural commodity. Organophosphorus is thelargest and most diverse compounds of pesticides and more than othercompounds used by farmers due to the effect on a widerang of pests and also being more affordable than other pesticides.(Shayeghi et al .,2008; samadi et al.,2009). Several researches have been conducted to determining the Diazinon insecticide remaining in environmental matrix (Agrawal et al,2010; Ahmad and et al,2008;Arjmandi et al 2010;Chein and et al,2000; Chen et al, Dehghani et al,2011; Fallah 2000;Gasempour et al 2002;Gomeysi 2004;Hazratian 2015;Khodadadi et al,2009;Kobayashi and et al, 2005; Soon and et al, 2007;Skopec and et al, 1993; Sumita and et al, 2008;Shayeghi et al 2001;Shayeghi et al,2007; Shayeghi et al 2008;dehgani et al,2011;Honarpajoh 2003;Selseleh 2003;Tavakol 2007;Doyli and

et al,2009; Chen et al,2009; Hasanzade and et al,2014; 2010; Shokrzadeh et al 2013Sumitra et al,2008; Sudo et al 2002; Struger, J., 2002).,,Khazaee and et al,

Materials and Methods

36 Samples of high yield rice grain were collected from different regions ofAmol, Mahmudabad, Fereydunkenar (East of Mazandaran province), in six times consist of after spraying, harvest time, one month after harvest, two months after harvest, three months after harvest, and six months after harvests in 2011 and 2012; The amount of 2 kg of paddy rice from the fields and from warehouses were collected. Then the samples were placed in to containers and trance ported to the laboratory. In laboratory, the samples were crushed by crusher machine and put in to disposable containers or freezer bags.In order to extraction of diazinon from the Rice samples first, 5 grams from milled sample of rice was weighted and placed in centrifuge tubes with lids. Then 10 ml of acetonitrile, 10ml of deionized water, 1 gr of sodium chloride, 6gr of magnesium sulfate and 1/5 gr of sodium nitrate were added to the samples. These samples were shaken by vortex for 1 minute and then centrifuged for 5 minute at 4000 RPM. 5ml from surface solution of the centrifuged samples was taken and transported in a 14-ml centrifuge tube; then 50 ml/gr of PSA and 150 mgr of magnesium sulfate were added. The following, tubes were shaken by vortex for 30 seconds and centrifuged for 1 minute at 4000 RPM. 1/5 ml from each sample extract was poured in to twisty vials with lids and completely dried in the evaporation apparatus. Finally, 1ml and 1µ of methanol will be added to this solution and GC/NPO apparatus, respectively; then amount of Diazinon will be measured.

Results

The amount of phosphorous Diazinon insecticide remaining in high yielding cultivars samples at East of Mazandaran (Amol, Mahmudabad, Fereydunkenar) was measured in 2011 and 2012; the resulting data are shown in figure 4 and 5 respectively and his biennial average is shown in figure 6.

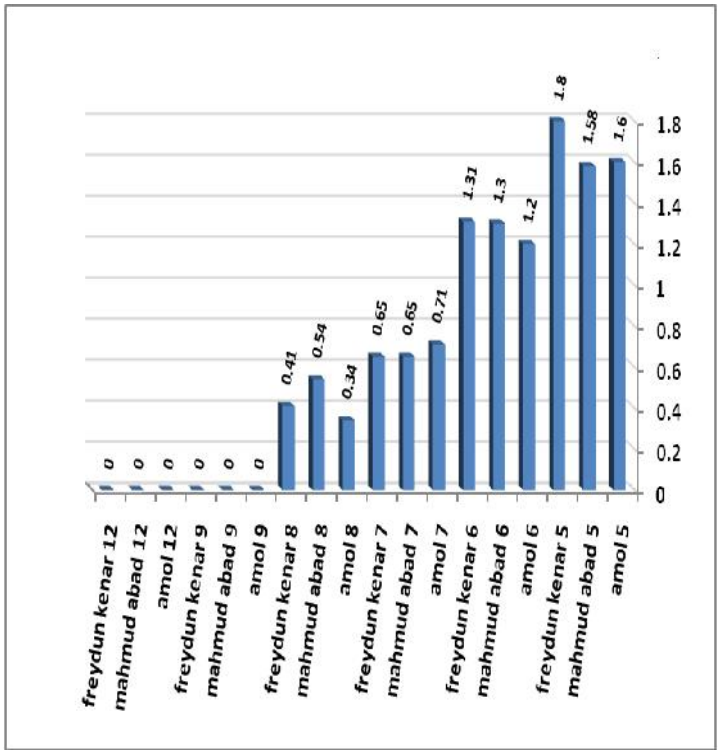

Figure 4- the measured Diazinon of high yielding cultivars samples at different regions in east of Mazandaran in 2011 (mg/kg))

According to the results in 2011, maximum concentration of Diazinon was 1/8 ppm that observed at Fereydunkenar, one month before harvest (after three times spraying at 15 June, 31 July and 15 Agust). Also, after two months of harvest, the amount of phosphorous Diazinon insecticide remaining in all samples was higher than permissible limit (figure 4). As shown in figure 4, Diazinon insecticide remaining of high yielding cultivars samples at all three regions mentioned above in 2011, were higher than permissible limit until two months of harvest in this year, there was no trace of Diazinon in studied samples after three and six months of harvest

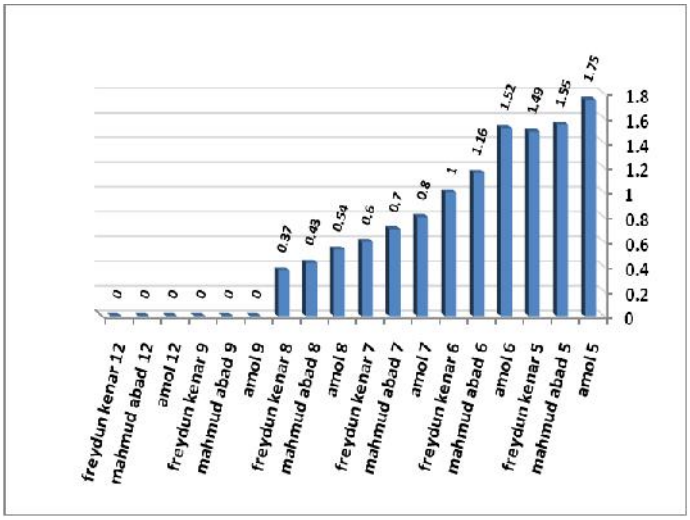

Figure 5- the measured diazinon of high yielding cultivars samples at different regions in east of Mazandaran, in 2012 (mg/kg)

According to the results obtained in 2012, maximum concentration of Diazinon was 1/75 ppm that observed at Amol, one month before harvest in August (this sample was sprayed three times at 15 June, 31 July and 15 August). Minimum amount of phosphorous Diazinon poison remaining in the samples, two months after harvest observed at Fereydunknear and was 0/37 ppm. Accordingly, Diazinon remaining of high yielding cultivars sampled at all three studied regions were higher than permissible limit until two months of harvest. After three and six months of harvest, there was no trace of Diazinon in these samples

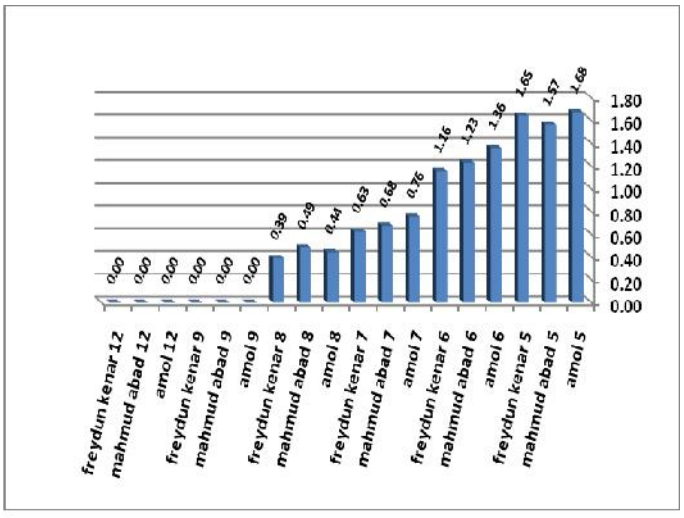

Figure 6- The measured Diazinon of high yielding cultivars samples at different regions in east of Mazandaran based on the Biennial average (mg/kg)

Figure 6, shows the biennial average of Diazinon remaining in rice high yielding cultivars samples at Amol, Mahmudabad and Fereydunkenar. Accordingly, Diazinon poison remaining at all three studied regions were higher than permissible limit until two months of harvest. Based on the biennial average in rice high yielding cultivars samples at this studied regions, is not seen no trace of Diazinon after three and six months of harvest (Figure 6).

Discussion

The results of this study indicate that in most samples after two months of harvest, Diazinon insecticide has been observed; Due to the permissible limit of this insecticide according to national standards (0/1 ppm), it would be a serious warning to consumers and health of region and country. Unlike previous researches in Iran, Diazinon poison remaining of high yielding cultivars samples in east of Mazandaran, are higher than permissible limit. In addition, the amount of Diazinon remaining has been increased during the previous years; thus farmers yet use from these poisons uncontrolled. Despite the efficiency of new methods such as use of Tricogramma bee, Bacillus turgensis bacteria and resistant cultivars to stem borer, this data indicate that there is notspecial attention to the new methods of pest management. According to the research done, Diazinon poison in samples at Amol and Babolcities was lower than permissible limit (Fallah 2000). Also, another study indicates increase of Diazinon poison remaining (pbb 16/2) on the samples of Tarom and khazar at Amol city (Shokrzadeh et al 2013). However, in the present study, that has been done at different areas of Mazandaran during two years, Diazinon poison remaining has increased dramatically, so that it maximum value was 1/8 ppm. Indiscriminate use of poison in two, three times, before taking rice skin, harvest immediately after spraying, lack of planning and refusal to implement of integrated pest management program, are reasons for increasing amount of remaining poison in rice samples. Comparison of this research with studies conducted in 2008 and 2011 indicated that Diazinon poison remaining was higher than permissible limit. According to manufacturer company recommendation, Diazinon poison will eliminate after three weeks; while in this research, Diazinon insecticide was entranced from samples even up to two months after harvest. This is likely due to the light stability of insecticide in the environment. A study in 2010 on the water used to irrigate the rice field at Amol, shows that phosphorous Diazinon poison sprayed on the rice fields, stays in the samples up to two months after harvest (Gasempour and et al 2011). The maximum amount of this poison in samples after harvest was 1/4 ppm and the lowest was measured in latest week of the second month. Comparison of this study with previous researches, indicates that amount of the phosphorous Diazinon poison remaining in sample high yielding cultivars, was higher than permissible limit but the maximum of this poison in present study was much higher from previous studied (Arjmandiet al2009).

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