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Investigation About Granulating Diazinon Insecticide Remaining in The Rice Grain of Mazandaran Province in North of Iran

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Abstract— **To evaluate the Diazinon remaining, 72 samples of rice at deferent stages of cultivation, harvesting and strong in the ware house, after spraying by Diazinon insecticide as long as there was no trace of insecticide in the rice, from cities of Ramsar,Tonekabon, Abbasabad (west of Mazandaran province), Amol, Mahmudabad, Fereydunkenar (East of Mazandaran province), Selected and studied. The highest measured levels of Diazinon after spraying in August before the harvest were 1,0/95, 1/07 ppm in 2011 and 1/2 , 1, 0/97 ppm in 2012 at qualitative cultivars in cities mentioned in the west of Mazandaran province; on the after side in the East of Mazandaran province, values of 1/58 , 1/6, 1/8ppm in 2011 and 1/55, 1/52, 1/75 in 2012 at high yielding cultivars were reported. The lowest measured concentrations of the insecticide after two months of harvest were 0/09 ppm in 2011-2012, at Ramsar, and abasabad in qualitative cultivars,0/34 ppm in 2011 at Amol and *0/37 ppm at Fereydunkenar. It was found that the biennial averages of Diazinon poison remaining in qualitative cultivars samples until one month after harvest were higher than permissible limit at Ramsar, Tonekabon and Abbasabad. The results, showed that the biennial average of Diazinon poison remaining two months after harvest at Tonekabon was higher than permissible limit hower this average was lower than permissible limit at Ramsar and Abbasabad (0/09 ppm). After there and Six months from the harvest, there was no trace of Diazinon at this studied regions. The remaining of Diazinon poison in high yielding cultivars samples of rice until two *months after harvest were higher than permissible limit at Amol, Mahmudabad and Fereydunkenar. Also, based on thebiennial average in high yielding cultivars samples after three and Six months from the time of harvest, there was no trace of Diazinon at studied regions in the east of Mazandaran province.***

Index Terms— **phosphorous insecticide, Diazinon, remaining, rice.**

I. INTRODUCTION

In the field of remaining amount of Diazinon insecticide, some researches have been done in Iran. Shayeghi and et al, investigated the phosphorous insecticide remaining in rice fields and citrus gardens at Tonekabon, in 2001[16]. Tavakoli measured the Diazinon insecticide remaining at harvest time in rice fields using "thin layer chromatography", in 2007[24]. Arjmandi and et al, reported the phosphorous insecticide in rice fields, in 2009[4]. Khazaee and et al, studied the ground water of Mahmoudabad region and reported that the remaining amount of Diazinon insecticide in this region was 0/002 to 0/572 ppm, in 2010[13]. Also, reported that in some samples, Diazinon was exceeding the permissible limit of world Health Organization. Hasanzade and et al, measured the Diazinon inseeticide remaining in water of rice fields at Tonekabon in 2014 they found that its value in summer was higher than 0/6 ppm) [12].

Skopec and et al, reported the remaining amount of organophosphorous insecticide in rice, in 1993[19]. Chein and et al, determined the organophosphorous insecticide remaining in rice, in 2000[7]. According to the latest research that has done around the world, some phosphorous pesticides like Diazinon are more stable in water compared to the rest [21;22;5]. Kobayashi and et al, reported the remaining of organochlorine, organophosphorous and Carbamate insecticides in rice, in 2005[14]. Several researches have been conducted to determining the Diazinon insecticide remaining using "high Performance thin layer choromatography" method [1;10;15;17]. Soon and et al, used the method of "multi residue" for analyzing the Diazinon insecticide remaining in rice by gas chromatography method, in 2007[20]. Ahmad and et al, reported the organophosphorous insecticide remaining in rice, in 2008[2]. Sumita and et al, studied about the organophosphorous insecticide remaining in rice, in water, soil and rice, in 2008[23]. Chen et al, determined the organophosphorous insecticide remaining in rice, in 2009[6]. Doyli and et al, Measured the organophosphorous insecticide remaining in rice, in 2009[8]. Depending on the type of experiment and method of measurement, a different result obtains from this researches. According to another study witch phosphorous and carbamate poison in rice and plant samples were studied, 0/9 ppm of phosphorous Diazinon poison was found in one case [3]. In the present, granulating Diaznion insecticide remaining in rice samples of qualitative and high yielding cultivars at Mazandaran province were investigated during the years of 2011 and 2012.

II. MATERIALS AND METHODS

A. Sampling

72 Samples of tarom and high yield in grices were collected from different regions 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. Coolected samples were places in to plastic bags; a special label which include details such as the date

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and place of sampling were sealed on each of them. 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. Then this samples were transported to the freezer with a temperature of -20°C . Finally for the Diazion remaining tests, were used.

B. Diazinon Extract 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 mgr 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.

III. RESULTS

Phpsphorous Diazinon inseeticide remaining in rice qualitative cultivars samples at west of Mazandaran (Ramsar, Tonekabon, Abbasabad) was measured in 2011 and 2012; The resulting date are shown in figures 1 and 2, respectively. The average of the two years it has been shown in Figure 3.

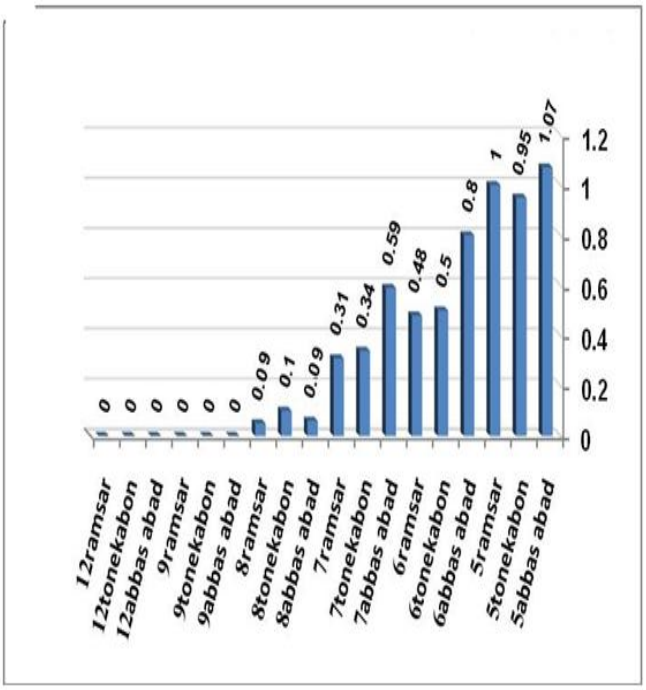

Figure 1-Diazinon value measured in milligrams per kilogram of sample quality rice varieties in different regions of the West of Mazandaran 2011

Figure 1 shows the Diazinon poison remaining of rice qualitative cultivars samples at Ramsar, Tonekabon and abbasabad, in 2011. According to the results, maximum concentration of diazinon was 1/07 ppm that was observed at Abbasabad in August, one month before harvest (after two times spraying at 15 June and 31 July). Also, after one month of harvest, Diazinon poison remaining in samples of all three regions was higher than permissible limit. After two month of harvest, Diazions poison remaining only in Tonekabon was higher than permissible limited; the Diazinon remaining in Ramsar and Abbasabad were 0/09 ppm that one less from the permissible limit. According to national standards, the maximum amount of Diazinon in rice, is 0/1ppm. Three and six months after harvest, there was no trace of Diazinon in rice qualitative cultivars samples.

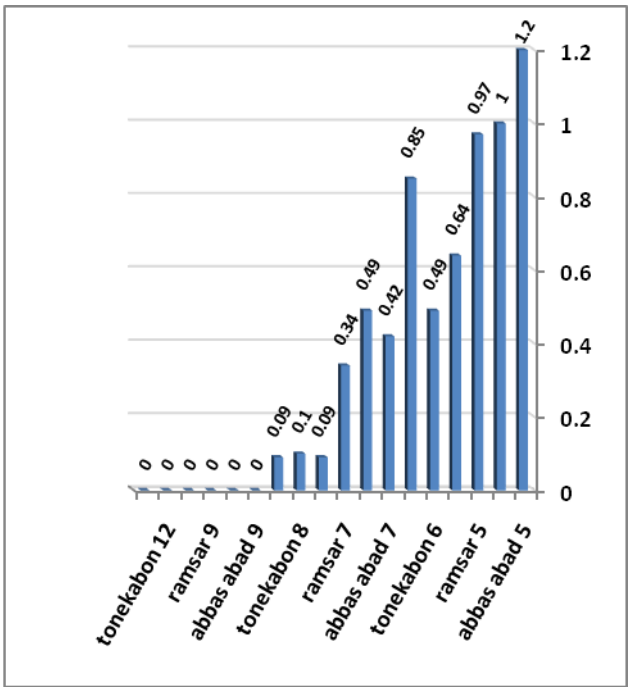

Figure 2- the measured Diazinon amount of rice qualitative cultivars samples at different regions in west of Mazandaran, 2012.

Figure 2 shows the Diazinon poison remaining of rice qualitative cultivars samples at Ramsar, Tonekabon and Abbasabad, in 2012. According to the results obtained in 2012, maximum concentration of Diazinon was 1/2 ppm observed at Abbasabad in August, one month before harvest (after two times spraying at 15 June and 31 July). The minimum concentration of phosphorous Diazinonpoision remaining in the samples, was 0/09 ppm that obtained from Ramsar and Abbasabad, two months after harvest. According to figure 2, we find that after two months of harvest, the amount of Diazinon remaining in some samples was higher than permissible limit. However after three and six months of harvest, there is no trace of Diazinon in rice.

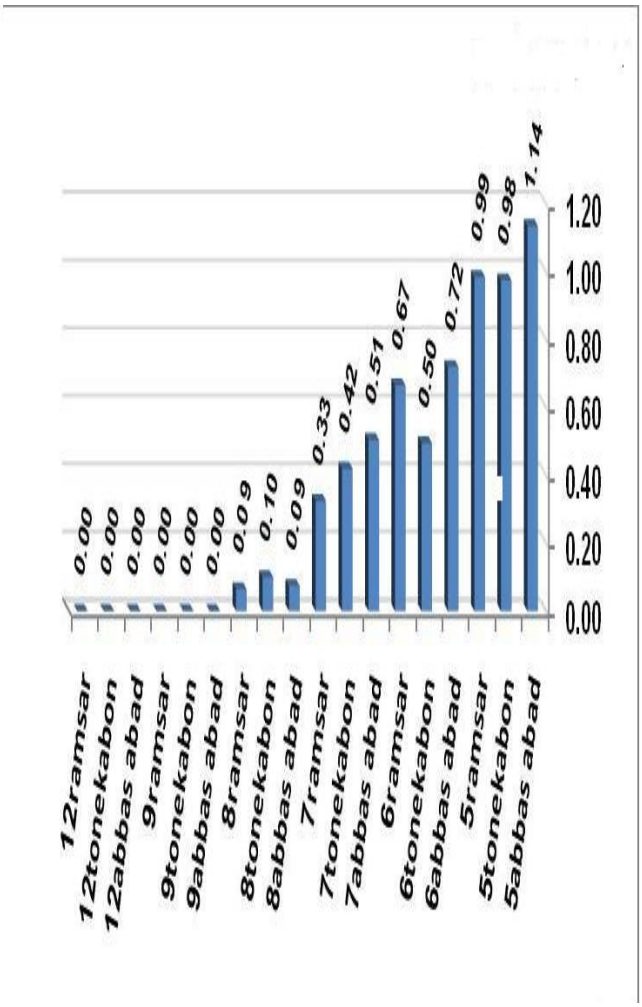

Figure 3- The measured Diazinon amount of rice qualitative cultivars samples at different regions in west of Mazandaran based on the biennial average (mg/kg).

Figure 3, shows the Diazinon poison remaining of rice qualitative cultivars samples at Ramsar, Tonekabon and Abbasabad. The results show that the Diazinon poison remaining of all studied samples in this regions after one month of harvest, were higher than permissible limit. Based on the biennial average of qualitative cultivars samples after two months of harvest, Diazinon poison remaining at Tonekabon was higher permissible limit; at this time the amount of Diazinon poison remaining at Ramsar and Abbasabad were 0/09 ppm, that are lower than permissible limit. As can be seen in figure 3, after three and six months of harvest, there is no trace of Diazinon based on the biennial average. The amount of phosphorous Diazinon insecticide remaining in high yielding cultivers 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.

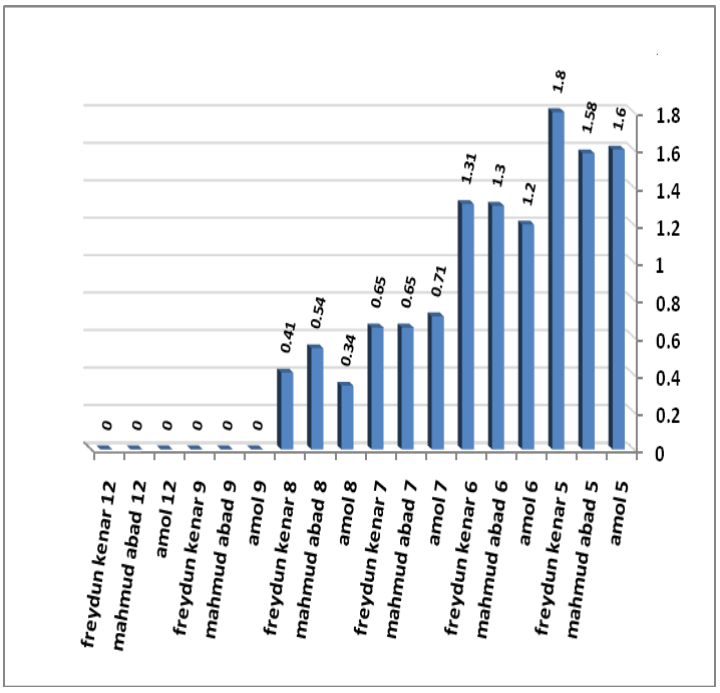

Figure 4- the measured Diazinon of high yielding cultivars samples at different regions in east of Mazandaran in 2011 (mg/kg).

According to the results in 2011, maximum concentraction 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 mentional 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.

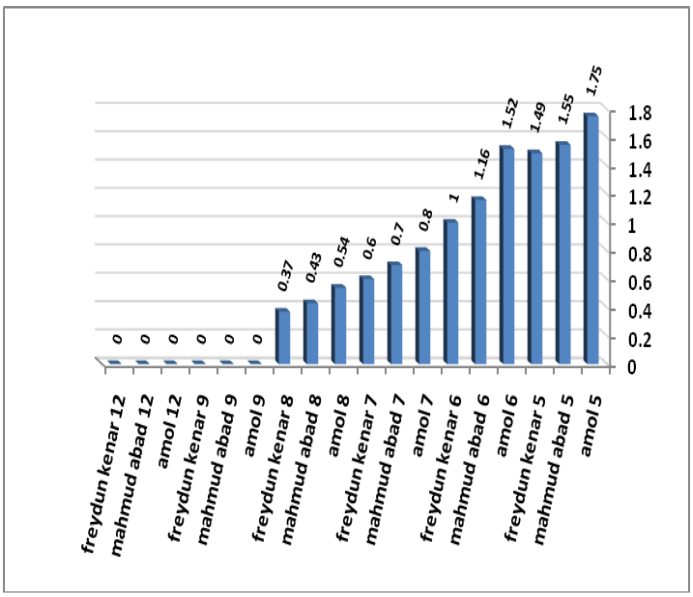

Figure 5- the measured Diazinon of high yielding cultivars samples at different regions in east of Mazandaran, in 2012 (mg/kg).

According to the results obtained in 2012, maximum concentration of Diazinon was 1/75 ppm that observed at Amol, one month before harvest in Agust (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 abserved 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.

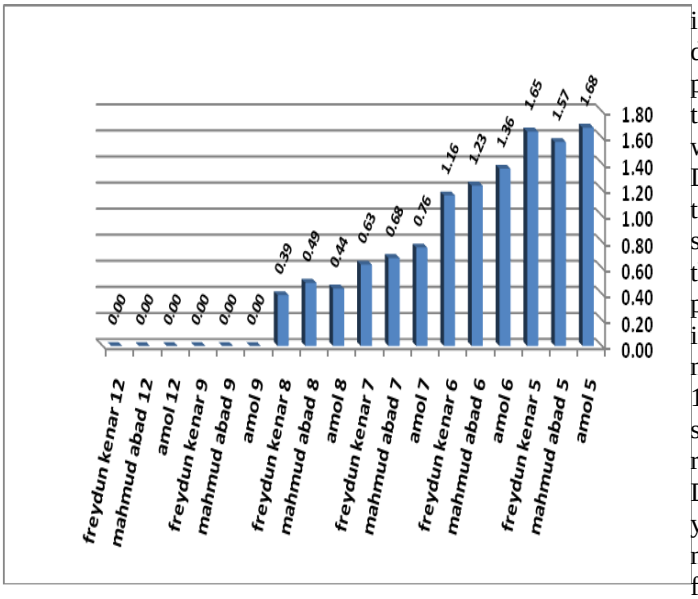

Figure 6- The measured Diazinon of high yielding cultivars samples at different regions in east of Mazandaran based on the Biennial average (mg/kg).

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).

IV. 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 Tarom and high yielding cultivars samples in west and 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 Tricograma bee, Bacillus turgensis bacteria and resistant cultivars to stem borer, this data indicate that there is not special attention to the new methods of pest management. According to the research done, Diazinon poison in samples of Tarom at Amol and Babol cities, was lower than permissible limit [9]. Also, another study indicates increase of Diazinon poison remaining (pbb 16/2) on the samples of Tarom and khazar at Amol city [18]. 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. Cpmparison of this research with studies conducted in 2008 and 2011, indicated that Diazinon poison remaining was higher than permissible limit. Difference between pollution in the east and west of Mazandaran is probably due to the difference in amount of spraying, number of spraying, higher poison concentration and incorrect use of poisons. 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[11]. 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 Tarom sample and similar high yielding cultivars, was higher than permissible limit but the maximum of this poison in present study was much higher from previous studied [4].

V. CONCLUSION

In present study, unlike the research cited above, amount of phosphorous Diazinon poison in all samples was measured; also the samples had different concentrations of Diazinon in comparison to prior work. In addition can be said that probably the consumption amount of phosphorous poison in studied regions, was more compared to the area under cultivation, type of rice and number of spraying.

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