International Journal of Farming and Allied Sciences
Available online at www.ijfas.com
©2015 IJFAS Journal-2015-4-3/222-225/ 31 March, 2015
ISSN 2322-4134 ©2015 IJFAS

Study on the process of herbicide degradation in paddy soils of Mazandaran province

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ABSTRACT: Herbicides are important for Grass weeds control but herbicide usage is one of the most important subjects in contaminants soil and water of fields. The length of time that the herbicides in soil is stable and active for agriculture and the environment is great. It s important that herbicides and their reaction control in natural ecosystems. For this goal , a test to check the amount of herbicide degradation in paddy fields in the Mazandaran province as a pilot test in a randomized complete block design was done. Treatments were including herbicide 1-control 2- herbicid with 50% concentration 3- concentration of 100% 4- and 150% concentration.The results showed that the herbicide concentration was reduced in the end of the sampling process. Herbicide half-life in the year 2012 was 28 days and in the year 2013 about 62 days.

***Keywords*:** herbicide, degradation, paddy soils, Mazandaran province

INTRODUCTION

Indiscriminate use of pesticides has adverse effects on the environment instead Positive effects such as damage to natural insect, secondary pest outbreaks and contamination of surface water, groundwater, soil and food can be named. (Radics, 2002).In addition, increasing prices and worry about residual pesticides in food, environmental risks, groundwater and surface water quality, reduce herbicide diversity, development of herbicide resistant weed populations and the health risks directly was led to the reduction in herbicide use (Pardo, 2005). Generally, the use of pesticides is increasing rapidly, and although the amount of herbicide compared to other pesticides in agricultural products is also a growing trend. From 1990 to 2003 the percentage of total herbicide pesticides from 3.6 per cent to 20.2 per cent was reached (Khan, 2006). The use of herbicides to control weeds can saves time and is stabilized rice yield but General and widespread use of chemicals for weed control products can cause serious problems such as the presence of residues in soil and crop rotation (DEBONA and AUDUS, 2006). Butachlor produced Machty brand in the year 1972 have been used for rice (Zand, 2002). The objectives of this research are including the following: study of the decomposition of herbicide in soil and of Under rice cultivation (B) review of the half-life of hebicide in soil studied area.

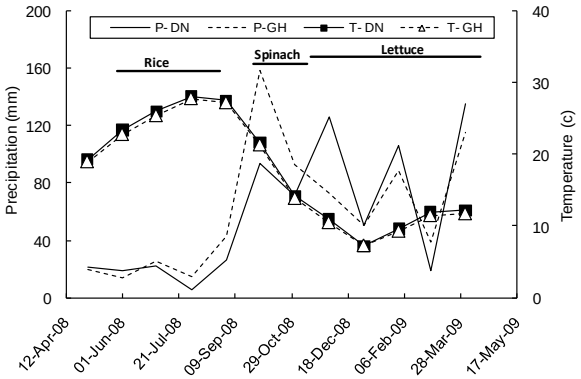
MATERIALS AND METHODS

To investigate the kinetics of degradation of herbicides in soil and water in the paddy fields of agricultural research station of Dsht¬Naz and Qara Kheyl were done field experiments. Soil properties in two research stations including Dashtenaz and Qara Kheyl were shown in table 1.

Table 1.Soil properties in two research stations including Dashtenaz and Qara Kheyl were

Texture	Clay (%)	Silt	CCE	OM	PH	CEC cmolc/ kg	stations
Silty Clay Loam	39/4	37/9	20/3	3/4	7/3	29/4	Dashtenaz
Clay Loam	39/4	41/4	60/5	5/6	7/7	28/7	Qara Kheyl

The two stations Climate Information are shown in Figure 1 .



This experiment with three replications and four treatments were arranged in a randomized complete block design. To run the tests, the experimental plots with dimensions of 4 × 3 m and 1 m distance between them are considered. Between the blocks were placed two meters away. Treatments were including herbicide 1-control 2-herbicid with 50% concentration 3- concentration of 100% 4- and 150% concentration. To measure the concentration in the soil Butachlor QuECheRS method was used. Samples were prepared for analysis by liquid chromatography (HPLC). The obtained data were analyzed using statistical software of mstatc and mean by Duncan multiple range test at the 5% level was calculated. Graphs were plotted and fitted by excel software.

RESULTS AND DISCUSSION

Results

Analysis of variance at level 1 percent had a significant effect on the concentration Butachlor (table 3).

Table 2. Analysis of variance of mean square of Butachlor in the year 2012

Significant	Df	Source of variation
0/001	2	Replication
0/001**	3	Butachlor
0/001**	9	days
0/002*	27	Days*butacholor
0/001	78	Error
8/27	Cv	

Table 4 shows graph of Butachlor concentration treatments of soil Butachlor concentration in the year 2012 .

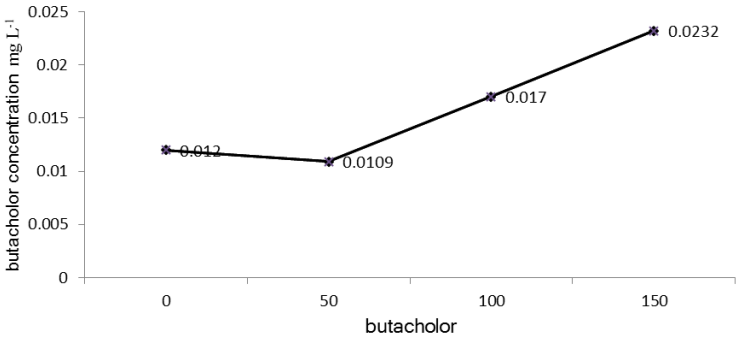


Figure 2. graph of Butachlor concentration treatments of soil Butachlor concentration in the year 2012
Figure 3 shows Graph of Butachlor concentration in the soil and sampling date after using year 2012 .

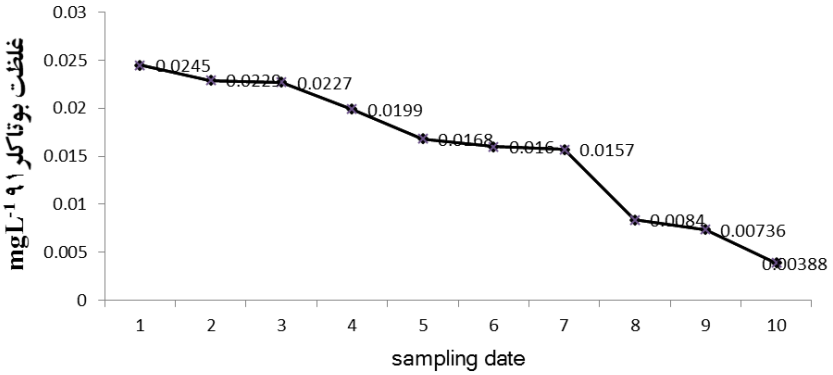


Figure 3. Graph of Butachlor concentration in the soil and sampling date after using yeay 2012
Figure 4 shows Graph of Butachlor concentration and sampling date in the soil after using in different treatments in the year 2012 .

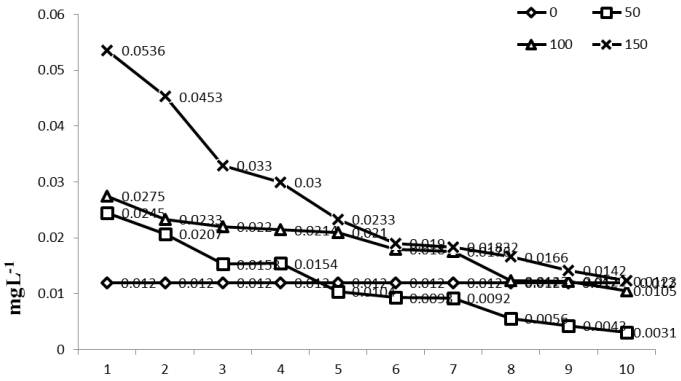


Figure 4. Graph of Butachlor concentration and sampling date in the soil after using in different treatments in year 2012.

Discussion

The results of this experiment indicated that the degradation of the Butachlor decreases with increasing time. In the year 2012 with concentration 50% the herbicide decomposition was reached to zero. The half-life of Butachlor in the year 1391 was 28 days. Johnson and Levi (1994) were calculated soil half-life of hebicide about 95 days. Butachlor adsorption was accrued by matrix as a combination of adsorption on organic matter and clay surface (Liu

. 2008). Herbicide degradation in anaerobic conditions and Ph of the soil may be a different situation (Rao, 1999). Analysis of herbicides in soil waterlogging America is set to 200 days (Quayle, Oliver and Zrna, 2006). Calculations showed that due to high adsorption coefficient and high hydrophobic, used herbicide in the soil is stable and immovable (Mahmoudi . 2011).

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