Chapter 3

Biological Activity and Biodiagnostics of the Irrigative Soils

3.1 Ferments Activity of the Irrigative Soils

At present a man is a main soilforming factor in the antropogen landscapes. Using of the soil resources in economy is a reason for natural ecosystem transformation and agrosenoz is replaced with the new, artificial structural elements, agrogen change of the natural landscape is global characteristic by increase of the population’s need.

The soils antropogen evolution depends on agricultural plants development to an important degree. The biotic components expose to the change from antropogen effect on natural ecosystem at first. According to this the ferments activity forming level and mechanism, ferments secretory changes at first, that’s why antropogen factor should be absolutely taken into account in the systemic-ecological analyses of the ferments forming and dynamics. The ferments activity is relatively high on upper biogen soil layer, but becomes weaker towards the law horizons along profile, this connects with the reduction of the quantity of organic substance reserve, animals, microorganisms and plant roots (Khaziyev, 2005). Last times the ferments activity is used as a test-system (Artyushenko et. al., 2005) in biological transformation of the biogen elements, a main diagnostic indicator in definition of the genetic type and fertility (Haciyev, 2000; Babayev, 1984; Shakuri, 2004) and eroding degree of the soils cultivation level (Shakuri, 2004). A role of the irrigation is great in change of the soil ecological condition, crop formation, increase of fermentative process activity. A main factor is an improvement of the air regime in the irrigative agriculture, this is a reason for other characters-agrochemical, usually a complex change of the nutrient movement, microorganisms activity, biochemical process activity.

It is possible to change, to direct ferments activity, intensity by planting agricultural plants. The conducted researches show that the ferments activity changes in the same soil type on a large interval. The plants alternation is a means which creates an optimal condition for regulation of the soil biological characters. Growing of the agricultural plants in crop rotation gives an opportunity to define a direction of the changes occurring in the soil, to understand such changes very clearly. Growing of the plants in crop rotation and constant tillage in a comparative form give an opportunity, to investigate occurring changes in soil more quickly, to understand necessity of the crop rotation application in getting high crop and in increase of soil fertility.

The practical and theoretical importance is great in using of the different type of soils under agricultural plants, in definition of the soil fertility formation objective laws, in study of the influence of the plants growing characters on soil peculiarities. As a result of the crop rotation application there is an enough material about soil ecological condition, physical, chemical and biological characters improvement at present. Growing of the plants in crop rotation and constant tillage effects on soil fermentative activity to an important degree. The ferments activity in the soils under the same plants is higher in crop rotation than in constant tillage (Beresteckiy and et. al., 1978; Orudzheva, 2009).

The ferments activity in the soils where leguminous plants (pea, lucerne) are grown is higher than grain-like, an influence remains in the last years, that's why a main agroecological measure is an application of the crop rotation in order to regulate ferments activity. A root system of lucerne possesses an ability to enrich the soil with phosphataza ferment (Abasov, 1980; Babayev and et al., 2009; Mustafayeva, 2005; Orudzheva, 2009), a as result the lucerne hag got an ability to ensure inself with phosphorus (Sushenicha, 1980). The leguminous plants rise an activity of phosphataza ferment, enrich the soil with phosphorus and calcium (Beresteskiy, 1983). The soils under the plants which are predecessors of the leguminous plants possess high biochemical activity (Berestetskiy, 1983; Smagin, 2006), the mobile forms of nitrogen and phosphorus aren't gathered (Beresteskiy, 1983; Babayev and et al., 2009; Orudzheva, 2009) as a result of mineralization of the plants organic remnants in the soil. The root secretion depends on root diversity and root remnant biomass by a quality. The ferments activity depends on plant development phase and grown in plant rizosphere, the ferments activity is high in the plant active development phase (Kiss and et. al., 1978). It was proved that constant planting of some agricultural plants especially vegetable plants reduces productivity strongly (Abasov, 1980; Babayev and et al., 2009; Orudzheva, 2009). Some researchers explained a reason of soil fertility reduction with the collection of toxic substances in soil (Mammadov, 1984).

3.1.1 Activity of Invertase Ferment

Studying corresponding ferments system, especially hydrolytic ferments activity connecting with the quantity and dynamics of the unspecific organic combinations in soil rouse an interest. More parts of the unspecific combinations enter the soil in the form of cellulose, lignin, nucleotides, albumens and etc. The soil specific ferment-carbohydrataces, phosphohydrolases, peptid-and amidohydralases participate in their overturn.

A main carbon source in soil is saccharose. Invertase ferment hydrolyses saccharose, till glucose and fructose. Fructofuranozidase from carbohydrolases is studied more. Overturn of carbohydrates by ferments forms a main chain of carbon circulation, they don't collect in soil because of fast exposing of them to chemical and biochemical overturns. The overturn of carbohydrates by ferments is a reason for entering of organic substances keeping much energy in their composition, accumulation in humus structure, as a result creation of the initial humus components. Invertase ferment spreads in high plants, microorganisms and soil, a diagnostic indicator can be in plants spreading in the soil (Kuprevich and et. al., 1966). According to V. F. Kuprevich (1974) a main source of invertaza in the soil is high plants, their highest activity happens in plants high development period and vegetation end, the period in which the plant remnants enter the soil and carbohydrates form 60% of the plant remnants. Distribution of the invertase ferment activity along the profile corresponds to the distribution of humus, carbon and microbiological activity in the investigative soils. The soils invertase activity depends on soil character and ferments, peculiarities, optimal pH is 4,5-5,0, temperature is 55-60^{0}C for its activity (Khaziyev, 2005).

An activity of invertase and catalase is the soil information indicator (Konstantinova, 2006). Some authors studied objective laws of the change of invertase ferment activity depending on season, hydrothermic condition and plant cover, soil chemical nature, physical-chemical characters in Azerbaijan soils different type (Abduyev, 1987; Agabekova, 1984; Babayev and et al., 2009; Jumshidova,1987; Orudzheva, 2009).

Dynamics of the invertaza ferment activity in the irrigative grey-brown soils. The crop rotations have been tested in the irrigative soils of the subtropic zone in order to study changing of invertase ferment activity in what direction depending on soil-ecological condition. An invertase ferment activity was AI^{I}_{a} 6,95-15,26 in tillage layer and in layer under tillage was AI^{II}_{a} 6,40-13,49 and was 6,06-11,83 and 5,38-11,31 mg of glucose on the constant tillage under separate plants on vegetable-fodder crop rotation in the irrigative grey-brown soils of the arid subtropic semidesert zone at the research period.

An activity under lucerne changes in an interval of 9,21-14,38 mg of glucose on 0-50 cm of the layer on the I scheme at the research period. The invertase ferment activity in the annual lucerne+barley version and under two-year lucerne in March is 9,97 and 13,15 on the tillage layer, the activity gradually rises to 12,46 and 14,70 mg of glucose till June, the activity in connection with the hydrothermical regime aggravation reduces to 11,64-12,81 in August and it rises to 13,44-15,22 mg of glucose in October. Entering of the plant remnants the soil in a great number at this vegetation period is connected with the enrichment of the soil with the organic substances by strong underground and surface reserves of the lucerne. The activity in the soils under Lucerne is observed in two maximum months of July an October. The good hydrothermic condition after barley gathering in lucerne+barley version accelerates the lucerne development and a strong root system begins to be formed and the roots of the barley which remain in the soil are a main energy source for microorganisms development. Some authors show that the plants structure and development phase play an important role in formation of the invertase ferment activity (Orudzheva, 2009; Abasov, 1980; Mustafayeva, 2005).

The statistic calculations show that an activity under lucerne and on under tillage horizons is 10,38-14,50 mg of glucose, a variation coefficient changes by 8,78-13,90%.

The invertase ferment activity under watermelon is in dynamic nature and changes by AI^{II}_{a} 8,65-12,08 mg of glucose on under tillage horizon, but AI^{I}_{a} 10,53-14,85 mg of glucose on tillage layer at the rotation period. An average mark of the invertase ferment activity in the soils under the water-melon plant was maximum on the tillage horizon on the first scheme in June (14,85 mg of glucose), got minimum mark by reducing in August (10,53 mg of glucose) and increased again in September-October (12,48 mg of glucose). The activity was little under water-melon on the second scheme in comparison with the first scheme. So, the conducted researches show that the activity in the soils under water-melon was maximum in July, October. The statistic calculations show that the invertase ferment activity in the soils under watermelon changed by 10,32-12,88 mg of glucose, a variation coefficient changed by 11,45-13,11% on 0-50 cm of the layer.

The invertase ferment activity in the soils under the potato relatively raised in June, reduction continued till September, the activity was observed in two maximum – June and October. The higher indicator of the activity under the potato on the 1st scheme was in June, it formed 11,01 mg of glucose on 25-50 cm of the layer and 13,84 mg of glucose on the 0-25 cm of the horizon, in spite of activity increase in October it was 3,66 unit less than in June. The mathematic statistic calculations show activity accordingly 10,78±0,447 and 9,25±0,306 mg of glucose on tillage AI^{I}_{a} and under tillage AI^{II}_{a} layers under the potato, changing of variation coefficient by 13,35-16,72%.

In the years of the carried out research the invertase ferment activity on the tillage layer under garlic was by 6,95-11,09 mg of glucose and relatively high activity was in June and October. The garlic preserves plant remnants in a little quantity after itself, its root is fringy, it is situated on soil surface, the activity was very weak because of little substrate for invertase ferment which has an ability to shatter carbohydrates in the plant remnants. The activity gets a maximum mark and forms 11,09 mg of glucose on the tillage layer in June. The least activity under garlic – 6,95 mg of glucose is observed in September. In the summer months an unfit condition is formed for biological process and ferments activity as a result of strong reduction of the nutrient being assimilated after intensive mineralization of organic substances in the spring while drying the soil, rising temperature strongly (because of end of the garlic vegetation period and not being irrigated an area). The mathematic analyses show forming of the invertase ferment activity in the soils under garlic plant 8,59±0,370 mg of glucose on tillage layer, 7,73±0,288 mg glucose on under tillage layer, a variation coefficient changes by 14,99-17,36%.

After ending of technical ripening of the winter white-head cabbage and crop harvesting an area sowing, irrigating and planting of tomato as an interval plant influence positively on ferments activity together with the improvement of soil aeration. The interval tillage increases crop deduction being gathered from the unit area together with reserving of soil fertility.

In the version of white head cabbage+tomato the invertase ferment activity at the vegetation period reduces (on 0-25 cm of layer) along the profile it forms 10,60-14,04 mg of glucose on 0-25 cm of layer and 9,13-12,33 mg of glucose on 25-50 cm of layer and it is observed in two maximum months – July and October. The relative high activity of invertase ferment in the soil under white-head cabbage+tomato is 14,04 mg of glucose on tillage layer of AI^{I}_{a} (0-25 cm) in July and 12,33 mg of glucose on under tillage layer of AI^{II}_{a} (25-50 cm), 13,02 and 11,06 mg of glucose in October. The activity weakening is striking as a result of the mutual influence of biotic and abiotic factors with the temperature increase in August, this is reflected in decrease of invertase ferment activity. In spite of weakening of the activity relatively at this period, it was enough in comparison with the plants. The statistic calculations show 10,36-12,60 mg of glucose on 0-50 cm of layer of the invertase ferment activity in the soils under white-head cabbage+tomato, a change of variation coefficient 10,82-12,02% in the interval.

In the research years an activity is 6,93-12,99 mg of glucose in the soils under potato and water-melon plants on the second scheme. The activity under potato and water melon was minimum in August and it rised in October. The activity under water melon changed on a layer of AI^{I}_{a} 9,16-12,99 mg of glucose and AI^{II}_{a} 7,82-11,02 mg of glucose on under tillage layer at the vegetation period. The mathematic analyses show that a change interval of the invertase ferment activity in grey-brown soils under the potato was AI^{I}_{a} on the layer of tillage and 7,92-10,30 mg of glucose on under tillage layers AI^{II}_{a}, a variation coefficient was 15,96-16,84%, 9,35-11,42 mg of glucose and 11,55-13,97% under water-melon accordingly.

The activity under vegetable bean on the tillage (0-25 cm) layer changed by 9,49-14,80 mg of glucose and 8,69-12,63 mg of glucose on under tillage layer (25-50 cm) at the vegetation period. A suitable soil-ecological state effects positively on plant development, it increased invertase ferment activity and it was 14,80 mg of glucose on tillage layer (AI^{I}_{a}) and 12,63 mg of glucose on under tillage layer (AI^{II}_{a}), they are noted in two maximum-July and October, maximum of October was less than in July.

The vegetable bean enriches the soil with the plant residues at the end of vegetation as leguminous plants. The mathematic analyses show that the activity under vegetable bean was 10,63-13,00 mg of glucose on tillage and under tillage layers, the variation coefficient changed by 11,06-14,01%.

The activity under tomato on the 2nd scheme formed 8,9 mg of glucose on 0-25 cn of layer in early spring, till July it rises 12,23 mg og glucose, in August it reduces by hydrothermic condition weakening (humidity is 13%), temperature is $27,9^{0}C$, additions are 17 and 21) and it formed 9,32 mg of glucose, two maximum are noted according to the activity – in July and October, it is 7,39 and 10,94 mg of glucose on under tillage layer. The mathematic statistic calculations show that an activity was 8,75-10,74 mg of glucose on tillage and on under tillage layers of tomato, a variation coefficient changed 11,78-14,08% in the interval.

The comparison of the constant tillage with crop rotation shows that an objective law of the activity change under separate plants is as on crop rotation at the vegetation period but activity is less. The higher activity under the plants being grown in the constant tillage was under vegetable bean, it was the least under garlic and less than crop rotation. In research years the invertase ferment activity was 7,54-10,20 mg of glucose on tillage layer of AI^{I}_{a} (0-25 cm) under tomato, 6,71-9,76 mg of glucose under watermelon, 7,55-9,73 mg under potato, 6,06-9,84 mg under garlic, 9,04-11,78 mg under white head cabbage and 8,31-11,83 mg under vegetable bean, along the profile reducing down on the under tillage layer AI^{II}_{a} (25-50 cm) it was accordingly 6,62-9,84; 5,98-8,10; 5,86-8,93; 5,38-6,86; 8,30-10,80 and 7,61-11,31 mg of glucose. The mathematic calculations show that an invertase ferment activity was in the constant tillage on the tillage layer of vegetable bean by 10,34±0,536, 8,82±0,442 in tomato, 8,23±0,417 in watermelon, 8,43±0,372 in potato, 7,81±0,357 in garlic and 10,18±0.364 mg of glucose in white head cabbage, a variation coefficient changed by 13,34-23,76% on 0-50 cm of the layer.

So, a comparison of the crop rotation schemes being applied in the irrigative grey-brown soils shows that invertase ferment activity on six-field vegetable-forage crop rotation was higher than constant tillage in two schemes, on five-field vegetable-leguminous plants crop rotation. The plants comparison shows that the higher activity was observed under lucerne, vegetable bean, the less activity under garlic.

Dynamics of the invertase ferment activity in the irrigative grey-meadow soils. The invertase ferment activity under plants which are grown on 4-field vegetable-forage crop rotation was 6,19-12,63 on tillage and under tillage layers and 3,66-8,75 mg of glucose on the constant tillage at a research period of the irrigative grey-meadow soils in the dry subtropic semidesert zone. The activity under annual lucerne changed by 7,34-10,8 mg of glucose on tillage layer,7,24-9,13 mg of glucose on under tillage layer, 8,88-12,63 and 8,02-11,25 mg of glucose under two-year lucerne in March-October months, and an activity was high in July and October months. An average mark of the activity under two-year lucerne was 1,15 unit (13.0%) more than annual lucerne on 0-50 cm of layer. An activity under cucumber changed by 7,49-10,28 mg of glucose under tillage at the vegetation period and a higher activity was noted in July. The two-year lucerne as a predecessor had its a positive influence on shattering intensity of carbohydrates in the soils under cucumber being planted after itself and made a condition for preservation of the activity in a higher level. The activity on 0-50 cm of the layer of the irrigative grey-meadow soils under constant cucumber changed by 3,66-7,76 mg of glucose and an average mark of the activity was 2,61 unit (31,48%) less than crop rotation, The mathematic calculations show that an activity under cucumber was 9,00±0,328 on tillage layer, 7,57±0,402 on under tillage layer, 6,27±0,590 and 5,08±0,332 mg of glucose in constant cucumber, a variation coefficient changed by 11,54-29,79% in two versions.

An activity under tomato changed by 7,08-9,79 mg of glucose on 0-50 cm of layer, and it was noted according two maximums-July and October. An activity was 5,52-8,75 mg of glucose on tillage layer of constant tillage and 4,05-7,52 mg of glucose on under tillage layer and the activity was 1,74 unit (21,07%) less than the tomato version on crop rotation.

So, after an end of rotation show that there was no strong difference according to the activity under cucumber and tomato on 4-field vegetable-fodder crop rotation in the irrigative grey-meadow soils, this is explained by an influence of the two-year lucerne predecessor in the next years and biology of the plants.

Dynamics of the invertase ferment activity in the irrigative alluvial meadow-forest soils. The invertase ferment activity in the soils under plants being grown on the six-field vegetable-fodder crop rotation scheme is dynamically characterized and changed 7,42-12,15 on 0-25 cm of layer and 7,01-11,63 mg glucose on 25-50 cm of glucose in the irrigative alluvial meadow-forest soils in Guba-Khachmaz. At vegetation period an activity in the version of annual lucerne +barley changed by 6,27-11,03 on tillage and under tillage layers, 9,41-12,15 mg of glucose under two-year lucerne, the higher activity was in July and October. The less activity under annual lucerne +barley was in early spring, under two-year lucerne in August, an average mark of the activity under two-year lucerne was 17.88% more than one-year lucerne. The mathematic statistic analyses show an activity 9,28±0,313 mg of glucose on tillage layer in the version of annual lucerne+barley, 11,17±0,18 under two-year lucerne, 8,53±0,329 and 10,51±0,213 mg of glucose on under tillage layer, a variation coefficient changed by 6,62-15,55% on each two versions.

An activity under onion changed by 7,60-9,43 on tillage layer and 7,01-8,96 on under tillage layer, 5,20-6,82 and 4,01-5,21 mg of glucose on the constant tillage in March-October, two maximums for activity were noted in June and October and minimum in August. An activity was 2,76 unit (34.0%) more than constant onion. The mathematic analyses show an activity under onion 8,44±0,187 mg of glucose on 0-25 cm of layer on the crop rotation, 7,81±0,187 mg of glucose on under tillage layer, accordingly 5,86±0,188 and 4,87±0,146 mg of glucose on the constant tillage, a variation coefficient changes by 8,90-12,93% in every two versions.

At a period of rotation an activity changed by 7,03-9,29 mg/glucose on tillage and under tillage layers under the cucumber, a high activity was observed in June and October, the less one was observed in March and August.

The invertase ferment activity under constant cucumber changed by 5,09-7,12 mg/glucose on 0-50 cm of layer along the profile at the research period, it was 6,03-7,12 mg/glucose on tillage layer, 5,09-6,29 mg/glucose on under tillage horizon. The higher activity was observed on cucumber constant tillage in June, the less one was observed in August, an average mark of the activity on tillage layer was more than under tillage horizon, on crop rotation it was more than constant tillage. The statistic calculations show an activity 7,69-8,59 mg/glucose on tillage and under tillage layers under cucumber, a variation was 8,21-8,76%, accordingly 5,32-6,68 mg/glucose on constant tillage and changed by 12,43-14,62% in an interval.

An activity under white-head cabbage changed by 9,14-11,26 mg/glucose on 0-25 cm of layer and 7,96-10,49 mg/glucose on 25-50 cm of layer at the research period. The activity under white head cabbage was more enough in comparison with the growing other plants in March (in early spring), this is explained by cabbage biology and development of vegetative organs at the same period. The two maximums according to the activity are noted in June and October. At the research period and activity under constant white-head cabbage was 6,69-8,56 on tillage and 5,61-6,57 mg/glucose on under tillage horizon. An average mark of activity on the constant tillage was 6,74 mg/glucose and it formed 3,12 unit (29.5%) less than crop rotation. The mathematic calculations show that an activity was 8,81-10,28 on 0-50 cm of layer under white-head cabbage, 5,89-7,68 mg/glucose on constant tillage, a variation changed by 9,11-15,19% in every two versions.

After gathering the barley for green fodder a tomato has been planted. The invertase ferment activity was higher in comparison with the other plants because this field was under plant cover at the research period. An activity was 9,79-12,54 mg/glucose on tillage layer, 8,63-11,06 mg/glucose on under tillage horizon in the green fodder+tomato version at the vegetation period, an activity changed by 6,24-7,61 mg/glucose under the tomato on the constant tillage and a higher activity was observed in July, it reached minimum in August and it was 6,24 mg/glucose. Barley+tomato for green fodder and two maximums in the constant tillage versions of tomato were noted in July and October. The statistic calculations show that an activity is 10,48-10,98 mg/glucose, on the tillage layer in the version of the green fodder+tomato, 9,33-9,81 mg/glucose on the under tillage layer, a variation coefficient is 9,52-10,28%, on the constant tillage of the tomato it is accordingly 6,55-7,03 and 5,48-5,80 mg/glucose and 11,45-14,26%.

So, the invertase ferment higher activity was observed in the version of lucerne, green fodder+tomato, the less under constant onion on the six-field vegetable crop rotation which is applied in the irrigative alluvial meadow-forest soils. Two maximums under the plants which are grown for invertase ferment activity are noted in June-July and October.

Dynamics of the invertase ferment activity in the irrigative gleyey-yellow soils. The invertase ferment activity changed by 8,30-15,35 mg/glucose on 0-50 cm of layer of the crop rotation, 6,69-13,17 mg/glucose, on the constant tillage by characterizing seasonally under the plants that are grown in the irrigative gleyey-yellow soils.

The invertase ferment activity under the tomato on the tillage layer changed by 11,12-13,93 mg/glucose and on the under tillage layer it was by 10,22-12,35 mg/glucose, the higher activity was in July (13,14 mg/glucose) and in October

(12,76 mg/glucose), the least was in August (10,96 mg/glucose). The activity on the constant tillage was 9,50-12,66 on the tillage layer, changed by 8,39-11,18 mg/glucose on the under tillage layer and two maximums were observed for activity.

An activity under the tomato was more than the constant tillage and a higher activity is noted in July, the least in August. The statistic calculations that the invertase ferment activity under the tomato changed by 11,08-12,87 on the tillage and under tillage layers, it was accordingly 9,00-11,07 mg/glucose on the constant tillage, a variation coefficient changed by 7,94-14,75%.

An activity in the version white-head cabbage+maize was 10,10-14,63 mg/glucose on 0-50 cm of layer at the vegetation period. An activity under the constant white-head cabbage changed by 7,95-11,65 on the tillage layer (AI^{I}_{a}) at the vegetation period, 7,52-10,10 mg/glucose on the under tillage layer (AI^{II}_{a}), changed by 8,86-11,56 and 7,80-10,19 mg/glucose under constant maize. The white-head cabbage+maize, two maximums under maize and white-head cabbage on the tillage are noted in June-July and October. The mathematic analyses show that an activity under white-head cabbage+maize was 11,07-13,40 mg/glucose on the tillage and under tillage layers, 8,60-10,73 mg/glucose under maize on the tillage and 8,35-10,40 mg/glucose under white-head cabbage, a variation coefficient changes by 7,94-8,61%; 10,83-11,74% and 12,34-16,07%.

The invertase ferment activity under the onion was 9,68-12,09 mg/glucose on the tillage layer during the season, the activity on the under tillage layer was less.

The higher activity was observed in June and an activity was reducing till September. An activity of invertase ferment under the constant onion changed by 6,69-11,09 mg/glucose on 0-50 cm of layer in the research years and an activity was higher in June, two maximum for activity were observed in June and October. A mathematic calculation of the got results shows that an activity under an onion on the crop rotation changed by 10,69±0,254 mg/glucose on the tillage layer, 9,16±0,316 mg/glucose on under tillage layer, 9,31±0,403 and 7,88±0,363 mg/glucose on the constant tillage, a variation coefficient changed by 8,58-16,63%.

The conducted long researches approve the authors' idea. Maximum activity of invertase ferment is on humus layer of the soils surface for an activity the spring and autumn maximum, summer minimum were observed (Babayev and et al., 2009; Orudzheva, 2009).

The vegetable bean enters the leguminous family and possesses an ability to fix the air nitrogen, and to enrich the soil with nitrogen. In the gleyey-yellow soils that is acid by origin a great necessity is created for the leguminous plants planting under condition of the problem in lucerne growing from this point a vegetable bean is one of the valuable plants.

The activity in the soils under the vegetable bean was 10,61-14,24 mg/glucose on 0-50 cm of the layer at the vegetation period and two maximums were observed in July and October. The activity under vegetable bean was higher in comparison with the growing other vegetable plants. The activity in the soils under constant vegetable bean changed 9,16-12,6 mg/glucose on 0-50 cm of layer at the research period. The statistic calculations show that an activity under vegetable bean was 10,86-13,6 mg/glucose on the tillage and under tillage layers, 9,96-11,72 mg/glucose on the constant tillage, a variation coefficient changed by 9,62-10,99% and 14,32-15,29%.

The researches show that the invertase ferment activity in the irrigative soils of the subtropic zone changes to an important degree at the period of spring-autumn, so the activity is less dynamical than microflora activity and soil water-thermic regime. The consequences show that changing of the hydrothermic regime is one of the main factors in the invertase ferment activity change in the irrigative soils. The less activity in the soils under all the plants was at the beginning of the vegetation in March (in early spring) and August, the higher activity was in June-July and at the end of the vegetation, in October depending on plants vegetation, biology. We should note that a change of the ferments activity on crop rotation and constant tillage wasn’t always one-sided. This depends on growing plants biology, applying agrotechnics, fertilizing, a relation of the ferments to changing soil condition, soil characters and cultural level mostly. A change dynamics of the invertase ferment activity under different plants on the constant tillage on crop rotation is as in the plant of the same name at the vegetation period, but an activity reduced year by year.

So, a comparison according to the invertase a ferment activity of the soil types under irrigation condition shows that an activity in the irrigative gleyey-yellow soils is characterized by being higher than one in grey-brown, grey-meadow and alluvial meadow-forest soils.

3.1.2 Urease Ferment Activity

Urease ferment hydrolyzes urea till ammoniac and carbon gas plays an important in the soil nitrogen regime. Urease ferment is found in some microorganisms, mould fungus and soya bean and it enters the soil in the structure of plant residues, manure and nitrogen fertilizers. The urea is created as a product of the middle metabolism of the nuclein acids with the fundamental nitrogen, especially nitrogen organic combinations. An effect of urease ferment is very specific, it only influences on urea. The researches show that the nitrogen exchange plays a main role in all the biodynamical process occurring in the soil. The ferments which fulfill mobilization of nitrogen organic combination initial stage and nitrogen exchange play an important role in overturn of ferments nitrogen organic combinations and entering of organic substances the soil, they also ensure continuity in the nitrogen biological circulation and formation of soil plant-microorganisms system in the ecological system. The practice and theoretic importance of study of the reactions mechanism of the nitrogen mobilization process intensity and assimilating formation for the plants is great (Grishko, 2005). Ammoniac which is hydrolyze product is the main nutrient of the high plants. An overturn process of nitrogen and its combinations in the soil is one of the main chains in soil metabolism. This is connected with an unexampled role in biosphere, availability of alive organisms and soilforming process. Some interval products create in oxidizing of ammoniac till nitrate and participate different oxidizing ferments. A later evolution of nitrate, especially is a reason for denitrification process under anaerob condition, its reduction till ammoniac (assimilator denitrification) or its loss in the gas form, overturning into molecular nitrogen by oxidizing (Campbell, 1967). Study of ferment system in connection with the nitrogen circulation in soil assumes a significant importance in nitrogen exchange explaining, management of plants feeding by nitrogen.

There are all the ferments that take part in nitrogen metabolism of soil, but only 1-3% of nitrogen organic combinations are mineralized during the season. The nitrogen little molecular combinations are got as a result of organic nitrogen weak movement of soil under an influence of hydrolytic ferments. The latest is mineralized by unspecific ferments and by abiotic way and nitrogen in their structure turns into assimilating form. Hydrolyze of high molecular organic combinations occurs weakly in the soil. It is obvious that this chain of nitrogen overturn is determined by weak mobilization of nitrogen organic combinations in the soil. Some works are dedicated to the study of urease ferment activity in the soil. (Babayev and et al., 2009; Orudzheva, 2006; 2009; Aliyev, 1978; Jumshidova, 1987; Mamedzade, 2004).

The consequences of the experiments show that dynamics and transformation of the nitrogen combinations is connected with the ferments activity which fulfils nitrogen exchange. The ferments that fulfill nitrogen exchange are main diagnostic indicators of the intensity in nitrogen mobilization process (Khaziyev, 2005).

As a result of bright-grey soils cultivation the humus quantity and reserve, total nitrogen and its different forms quantity and urease ferment activity rises and the ferments activity that participates in nitrogen exchange is a main diagnostic indicator in definition of its level. The urease ferment activity reduces along the soil profile and it is connected with the quantity of organic carbon, clay, absorption capacity, humus, total nitrogen and organic combinations positively, but it is in a negative correlative relation with pH and humin acid quantity (Singh and et. al, 1991). Chitin that is from complicated chemical combinations belongs to nitrogen polysaccharides, they are met on the wall of the microorganisms cell, in outward cover of some animals and others, different actinomicets, microorganisms and bacteria take part in their shattering (Gasimova, 1985). The high plants play an important role in urease ferment collecting in the soil (Aliyev, 1978; Kuprevich, 1974), the highest activity is met under leguminous plants. A main factor in limiting of urease ferment activity in the gleyey-yellow soils in the Lankaran zone is characterized by the urease ferment activity depression, as a result of being of the soil with acid reaction, reducing of humidity and rising of the temperature in the summer (Mamedzade, 2004).

Dynamics of the ureaza ferment activity in the irrigative grey-brown soils. The urease ferment activity changed by 2,32-4,20 mg NH_3 on tillage and under tillage layers in the in the irrigative grey-brown soils under the lucerne at the research period. An activity on 0-50 cm of the layer vibrated by 2,49-3,36 mg NH_3 under annual lucerne+barley, 2,78-4,03 mg NH_3 under two year lucerne in March-October, the higher activity was noted in July and October, the least one was noted in the early spring (March) and September, an average mark of the activity under two-year lucerne was higher than annual lucerne+barley. It is obvious this is connected with the strong developed root system of the two-year lucerne being higher of biochemical activity and more quantity of microorganisms on rizospher. The urease ferment activity rised under all the plants by creation of the good condition in the soil in October. The statistic calculations show being of the urease ferment activity of the lucerne by 2,68-3,73 mg NH_3 on the tillage and under tillage layers, changing of variation coefficient by 10,92-13,78%. Entering of the lucerne the crop rotation raises urease ferment activity (Mustafayeva, 2005).

On the first scheme the urease ferment activity under the water-melon changed by reducing 2,63-3,79 mg NH_3 on 0-50 cm of layer along the profile, 2,32-3,53 mg NH_3 on the second scheme, 1,40-2,30 mg NH_3 on the constant tillage, the higher activity was noted in the high development phase of the water-melon in June, then an activity reduced till September and increased a little again in October. The statistic calculations show that the urease ferment activity was $3,42\pm0,111$ mg NH_3 on the tillage layer on the first scheme, $3,17\pm0,133$ on the second scheme, $2,01\pm0,091$ mg NH_3 on the constant tillage, $2,89\pm0,121$; $2,56\pm0,115$ and $1,53\pm0,084$ mg NH_3 on under tillage layer. The variation coefficient changed by 13,09-22,06% in all the versions under the watermelon.

An urease ferment activity on the tillage layer of the potato changed by 1,88-3,45 mg NH_3 on the tillage and under tillage layers on the first scheme, 1,83-3,15 mg NH_3 on the second scheme and 1,29-2,53 mg NH_3 on the constant tillage.

An average value of the activity was 0,21 unit more on the 1st scheme than the 2nd scheme and 0,82 unit more than constant tillage, two maximums according to the activity were observed in June and October. The statistic analyses show that an activity under the potato reduced along profile and was 2,15-3,08 mg/NH3 on 0-50 cm of layer on the 1st and 2nd schemes, 1,52-2,21 mg/NH3 on the constant tillage, a variation coefficient changed by 13,02-21,84% in all the versions.

An urease ferment activity of the garlic on the tillage layer changed by 2,19-3,05 mg/NH3, 1,89-2,44 mg/NH3 on under tillage layer, the higher activity was in June and October. Being little of the activity under the garlic is explained by its biology, entering of substrate the soil in very little quantity for increase of the activity after gathering. An activity on the constant tillage was less in comparison with the crop rotation, on the tillage layer it was higher the under tillage layer, it was 1,41-1,78 mg/NH3 on 0-50 cm of layer. The statistic calculation show that an activity under the garlic was 2,13-2,70 mg/NH3 on the tillage and under tillage layers, 1,35-1,84 mg/NH3 on the constant tillage, a variation coefficient changed by 13,20-25,11% on each versions.

The activity under whitehead cabbage+tomato changed by 2,74-3,62 mg/NH3 on the tillage, 2,44-3,18 mg/NH3 on under tillage layer, 2,23-3,28 and 1,88-2,60 mg/NH3 under the tomato on the 2nd scheme, the higher activity was observed in July. An activity was by 1,46-2,26 mg/NH3 on the constant tomato on the tillage layer, 2,46-3,11mg/NH3 on the constant white-head cabbage, 1,29-2,12 and 2,03-2,53 mg/NH3 on under tillage layer. The higher activity under tomato on the constant tillage was in July, it was in white-head cabbage in June. The statistic calculations show that the activity on the tillage and under tillage layers was 2,68-3,19 in the version of the white-head cabbage+tomato, 2,37-2,94 under the tomato on the 2^{nd} scheme, 1,54-2,07 under the tomato on the constant tillage and 2,20-2,81 mg/NH3 under the white-head cabbage vibrated by 11,39-26,36% in the versions which in a variation coefficient is applied.

So, the got consequences show that an activity of urease ferment under the plants on the 1^{st} scheme is higher than the plants on the 2^{nd} scheme. A higher activity of urease ferment was in the versions of the two-year lucerne, white-head cabbage+tomato, vegetable bean, watermelon (a predecessor is two year lucerne), the least one was under garlic. An activity under all the plants reduced till September and raised again in October after getting a maximum mark in June-July.

Dynamics of urease ferment activity in the irrigative grey-meadow soils. The urease ferment activity changed by 1,94-5,16 mg/NH_3 on 0-50 cm on the crop rotation, 0,67-2,92 mg/NH_3 on the constant tillage in the grey-meadow soils. The higher activity was under the lucerne in comparison. This indicator was 3,10-4,60 on the tillage layer in the version of the annual lucerne, 2,55-4,12 mg/NH_3 on under tillage layer, 3,25-5,16 and 3,13-4,86 mg/NH_3 under two-year lucerne. Two maximums are noted under lucerne for an activity. An average mark of the activity under the two-year lucerne was 0,58 unit (14,11%) more than one year lucerne. The statistic calculations show that an activity under an annual lucerne was 3,15-3,91mg/NH_3, 3,72-4,54 mg/NH_3 under the two year lucerne, a variation coefficient changed by 15,72-17,79%.

An activity under a cucumber was 2,41-4,17 mg/NH_3 on 0-25 cm of layer than the soils under a lucerne, 1,54-3,26 mg/NH_3 on 25-50 cm of layer, 1,25-2,34 and 0,58-1,54 mg/NH_3 on the constant tillage, an average mark of the crop rotation was 1,43 unit more (52,27%) than the constant tillage. The mathematic-statistic calculations show that an activity in the soils under a cucumber changed by 0,80-3,28 mg/NH_3 on 0-50 cm of layer, a variation coefficient changed by 22,92-71,13%.

An activity on 0-50 cm of layer changed by 1,76-3,41 mg/NH_3, 1,12-2,44 mg/NH_3 on the constant tillage under a tomato in the grey-meadow soils.

The activity was 0,81unit (33,6%) less than crop rotation on the constant tillage. The variation coefficient changed by 25,45-48,77% in each two versions.

So, an activity is determined by biology and development type of the growing plants together with the soil-ecological condition and an activity was less than grey-brown soils of the arid subtropic zone.

Dynamics of the urease ferment activity in the irrigative alluvial meadow-forest soils. The urease ferment activity under the annual lucerne+barley and two-year lucerne changed by 3,80-5,35 mg/NH_3 on 0-50 cm of layer, the higher activity was observed in July and October. An average mark of the activity under the two-year lucerne was 0,49 unit more on 0-25 cm of layer and 0,49 unit more on under tillage layer in comparison with annual lucerne+barley. The mathematic-statistic calculations show that the urease ferment activity changed by 3,94-5,17 mg/NH_3 0-50 cm of layer under the lucerne, a variation coefficient changed by 8,36-10,06%.

The two-year lucerne influenced on biochemical process, ferments activity under onion. From this point an activity under an onion changed by 3,50-4,19 mg/NH_3 on the tillage layer and 2,87-3,95 mg/NH_3 under tillage layer, 2,27-4,07 mg/NH_3 on the tillage and under tillage layers of the constant tillage, the higher activity was observed in June and October, the least one was observed in early spring and in September. An average mark of the activity under an onion was 0,65 unit more than the constant tillage. The mathematic analyses show that the urease ferment activity under the onion was 3,75-3,93 mg/NH_3 on the tillage and 3,26-3,48 mg/NH_3 on under tillage layer, a variation coefficient changed by 9,81-12,68%, 3,00-3,28; 2,68-2,96 mg/NH_3 and 17,62-20,44% on the constant tillage.

An activity under the cucumber changed by 3,39-4,23 mg/NH_3 on the tillage layer, 2,84-3,63 mg/NH_3 on under tillage layer, 2,59-3,41and 2,25-2,86 mg/NH_3 on the constant cucumber tillage at the rotation period, the higher activity was in July and October. A change law objective on the constant tillage over the months was as on the crop rotation. The mathematic calculations show that an activity under the cucumber changed by 3,11-3,88 mg/NH_3 (0-50 cm) on the tillage and under tillage layers, a variation coefficient was 11,54-12,38%, it changed by 2,41-3,01mg/NH_3 and 14,67-15,25% on the constant tillage. The higher activity in the irrigative alluvial-meadow-forest soils depends on plants biology, hydrothermical regime in June-July and October. The higher activity alluvial-meadow-forest soils under the growing plants was in the version of the two-year lucerne, green fodder+tomato and the least one was under the cucumber.

Dynamics of the urease ferment activity in the irrigative gleyey-yellow soils. The urease ferment activity under the plants entering the crop rotation in the irrigative gleyey-yellow soils of the humid subtropic zone in the research years changed by 2,21-3,96 mg/NH_3 on 0-50 cm of layer and 1,64-3,94 mg/NH_3 on the constant tillage.

An activity under the tomato vibrated by 2,66-3,22 mg/NH_3 on 0-50 cm of layer in the research years, the least activity was in March-September, the higher one was in July and October. The activity under the tomato changed by 2,93-3,58 mg/NH_3 on the tillage layer and an average mark of the activity was 0,62 unit less on under tillage layer than the tillage layer. The urease ferment activity on the constant tomato tillage changed by 2,45-2,95 mg/NH_3 on the tillage layer and 2,06-2,59 mg/NH_3 on under tillage layer at the vegetation period, the higher activity was observed in July. The mathematic calculations show that an activity on the tillage layer under the tomato was 3,24±0,083, on under tillage 2,62±0,058 mg/NH_3; 2,72±0,087 and 2,33±0,094 mg/NH_3 on the constant tillage, a variation coefficient changed by 7,92-14,57% on each two versions.

After gathering the white head cabbage the maize was planted in the area and this conditioned new substrate entering the soil again for urease ferment. At the vegetation period the activity was kept in a higher level, it was more in October, 3,61mg/NH_3 on the tillage layer and 2,92 mg/NH_3 on under tillage layer. At the research period the activity reduced along profile and changed by 2,63-3,27 mg/NH_3 on 0-50 cm of layer. An activity under the cabbage on the constant tillage was 1,80-2,96 mg/NH_3 on the tillage layer and 1,64-2,71mg/NH_3 on under tillage layer, it was 2,50-3,28 and 2,23-3,17 mg/NH_3 under the maize. Two maximums under the constant maize were observed in July and October. The statistic calculations show that an urease ferment activity changed by

2,58-3,36 mg/NH_3 on 0-50 cm of layer, 2,56-3,11 mg/NH_3 in the constant maize and 1,97-2,53 mg/NH_3, in constant white-head cabbage, a variation coefficient changed by 10,28-24,92% on the research versions.

An activity under an onion reduced along the profile was 2,33-3,17 on the tillage layer and 2,09-3,05 on under tillage layer, it was some less on the constant tillage, it changed by 1,55-2,82 mg/NH_3, the higher activity was in June, two maximums were noted in June and October. The mathematic calculations show that an activity under the onion was 1,77-2,88 mg/NH_3 on crop rotation and on 0-50 cm of layer of the constant tillage, a variation coefficient changed by 12,17-27,31% at the vegetation period.

An activity under the vegetable bean changed by 3,21-3,96 mg/NH_3 on 0-50 cm of layer along the profile, 3,48-4,29 on the tillage layer and 2,93-3,62 mg/NH_3 on the under tillage layer, two maximums were noted and an activity was higher than other growing plants. An activity under the constant vegetable bean was 0,43 unit less than crop rotation, 2,65-3,70 mg/NH_3 on the tillage layer and 2,66-3,27 70 mg/NH_3 on the under tillage layer the change objective law of the activity was as in crop rotation. The statistic calculations show that an activity under vegetable bean was 3,70-3,96 mg/NH_3 on the tillage layer and 3,20-3,40 mg/NH_3 on under tillage layer, this indicator on the constant tillage was 2,79-3,49 mg/NH_3 and a variation coefficient changed by 8,88-15,94%.

So, the got consequences show that the urease ferment activity was higher in the irrigative alluvial meadow-forest soils than grey-brown, grey-meadow and gleyey-yellow soils. It is obvious that a factor which limits an urease ferment activity playing an important role in the nitrogen circulation in the irrigative gleyey-yellow soils is acid property of the environment and salinity of the grey-meadow soils. Collecting of the combinations by origin of nitrogen little in the irrigative grey-brown soils, being little of the humus quantity can be explained by occurring mineralization more intensive than humification process. The higher activity under growing plants was under leguminous plants lucerne, vegetable bean, the least one under onion, garlic, two maximums were observed in June-July and October depending on plants development phase and soil-ecological condition. A variation coefficient of the urease ferment activity under growing plants on the constant tillage changed in a larger interval than the plant of the same name on crop rotation, this shows reduction of the biological indicators at the time limit quickly as a result of planting of the culture for 4-6 years in the same area.

An urease ferment activity under the plants growing on the crop rotation was higher than the plant of the same name on the constant tillage and under tillage layer on the sowing layer.

3.1.3 Phosphatase Ferment Activity

The phosphohydrolithic ferments hydrolize phosphorepher relation in the different phosphorus organic combinations in the soil. The ferments activity from phosphohydralase group is a main indicator in definition of the physico-chemical features and agrocenoz level, soil genetic characters, intensity and direction of the biochemical process in connection with the organic phosphorus and phosphorus fertilizer mobilization in the soil (Khaziyev, 2005). A level of the phosphatase ferment activity in the soil determines a potential ability of the phosphorus mobilize process and an intensity of this process direction. Depending on soil environment reaction the phosphatase ferment distribution character can be explained by metabolic activity and microbiocenoz composition secreting phosphatase ferment.

Most of the bacteria show a high phosphatase activity in neutral and weak acid environment and phosphataza pH which they secret is near the neutral (Kozlov, 1970). Acid and alkaline phosphatazaz are mainly available in the nature. According to the authors' ideas alkaline phosphatase is stablest on the upper layers of the soils, asid phosphatase is stablest on the under layer in a space frame (Sinegani and et. al., 2006). The soils organic phosphates are divided into two groups: phosphorus humin acids, fulvo acids and humins enter the specific humus substances, the nuclein acids, inozitphosphat different reproductions, phospholipids, phosproteins, sacharophosphats as metabolic phosphates, glicerin phosphates and adenezintriphosphat (ATF) enter the inspecific combinations (Anderson, 1975). The experiments show that inozinphosphats and nuclein acids are found in the structure of phosphoorganiccombinations very much and they don’t form more than 1% of the soil organic phosphate. The phosphorus fertilizers that the plants can assimilate and possess phosphorus combinations are applied in the soil every year, but phosphorus assimilating coefficient is very low, forms 10-25%, the rest part subjects to the different overtures and assembled in the soil. Phosphorus which are related hardly and the plants can’t assimilate forms 30% of the total phosphorus on average (Boldeskul and et. al., 2004).

Phosphohydrolazas participate in phosphororganic combinations mobilization entering the soil. Inspecific phosphomonoesterases and specific depolimerases, ribonucleinases, denucleinases, phosphordiesterases, inorganic polyphosphohydralaess, phytases and other ferments perform their hydrolize, the soils possess a high activity according to inspecific phosphatases, therefore simple phosphor organic combinations are easily hydrolyzed and don’t assembled in the soil to a considerable degree (Anderson, 1975). After mineralizing the inspecific combinations the inside cell and plant roots phosphohydrolases are used by plants and microorganisms.

We can argue about phosphatase ferment activity according to the mobile phosphorus quantity in the soil. Despite conduction of many research works in the field of feeding of the plants with phosphorus, the investigations which are devoted to studying of the mobilize methods of the phosphorus combinations that the plants can't assimilate are little.

Phosphatase ferment performs biogeochemical function that assumes an importance on the phosphorus circulation continuously in biogeocenoz and ensures entering of mineral phosphorus the plant root. An activity of phosphatase and urease ferments depends on different forming combinations of phosphorus (Baligar and et. al., 1988). The phosphatase ferment activity doesn't completely ensure a need of soil for phosphorus, but characterizes biochemical process intensity. As a result of splintering of phosphorus organic combinations under an influence of phosphatase ferment a mobilization of organic phosphorus happens. A relation between phosphatase ferment activity and quantity of mineral phosphorus is determined by the latter one. Being more of the mobile phosphorus quantity stops synthesis of phosphatase ferment, it is determined by a ratio of C:P in this soil. It was determined that as a result of application of the fertilizer in soil by a ratio of C:P-20:1, synthesizing of phosphatase by microorganisms stopped (Spiers and et. al., 1978).

So, a regulative influence of inorganic phosphorus appears in a complex form in phosphorus potential formation of the soil under the natural condition, it depends on an ability of the apparatus of synthesizing ferment by microorganisms and plant roots. It is obvious that mobile phosphorus in the soil plays a decisive role to a definite degree in the definition of direction and intensity of biochemical overturn process of the soil phosphorus mobilization-immobilization. The phosphatase ferment activity is determined by genetic features, physical-chemical characters of the soil and agrocenoz level.

The least quantity of microorganisms that shatter phosphates is characteristic for brown soils, high quantity is characteristic for black like meadow-brown soils, however is doesn't depend on soil acidity. The phosphatase ferment activity is related little with the humus quantity and hydromorphism on upper layers in the black-soils (Kazeyev and et al., 2004; Khaziyev, 2005). It was determined that the soil characters, fertilizer application, agrotechnical measures influence on phosphatase activity to an importance degree (Robertson and et. al., 1997). Little work is devoted to study of the ferment variation of phosphatase in the soil (Aon and et. al., 2001).

Dynamics of phosphatase ferment activity in the irrigative grey-brown soils. The phosphatase ferment activity which performs shattering of phosphor organic combinations by a biological method in the irrigative grey-brown soils changed by 1,95-3,35mg P_2O_5 in 0-50 cm of layer under the lucerne, the activity was higher in July and September. An activity under the lucerne during a season forms 2,54-3,83 on a tillage layer (0-25 cm), 1,35-2,87 mg P_2O_5 on under tillage layer (25-50 cm). An average mark of the activity under the two-year lucerne was 0,5 unit more (17,8%) than annual lucerne +barley version. Because of strong development of the surface and underground root system of the lucerne, it uses from assimilating form of phosphorus from soil very much, as a result for an intensive mobilization of phosphor organic combinations, an increase of phosphatase ferment activity is observed.

Phosphatase ferment activity under the water-melon changed by 2,05-2,86 in 0-50 cm of layer on the first scheme and 1,72-5,52mg P_2O_5 on the second scheme and one maximum according to the activity was observed in June. A month of June coincides with a period of formation of the strong development phase, vegetative and generative organs of the plant. It is obvious that an increase of phosphatase ferment activity intensifies shattering of phosphor organic combinations because the plant assimilates the most phosphorus combinations for formation of the plant and fruit at the same period. An activity on the constant tillage changed by 0,83-1,99 on the tillage layer and 0,53-0,88 mg P_2O_5 on under tillage layer at the vegetation period. At the vegetation period an average mark of the activity in the soils under watermelon was 1,40 units (52,09%) on the I scheme and 1,13 units more (52,8%) on the II scheme. The mathematic analyses show that an activity was 1,96-2,87 on 0-50 cm of layer under watermelon on the I scheme, 1,78-2,53 on the II scheme, 0,62-1,45 mg P_2O_5 on the constant tillage, a variation coefficient changed by 13,39-37,00%.

The phosphatase ferment activity in the soils under the potato was 1,74-2,89 on the tillage layer (0-25 cm) 1,74-2,41 on under tillage layer (25-50 cm), on the I scheme changed by 1,48-2,65 and 1,25-1,48 mg P_2O_5 on the II scheme at the rotation period, one maximum for activity was noted in June, then an activity continued in a reduction direction gradually till October. The presence of the activity in a maximum level in July shows that the phosphatase ferment activity increased in order to compensate a need for mobile phosphorus as phosphorus reserve in soil which can be assimilated at the same time was mobilized for formation of the potato tuber and ensure the plant with mobile phosphorus. As a result of return of the plant residues in to soil after harvesting of the potato product in July the phosphorus combinations enter the soil and activity began to weaken gradually. An activity on the constant potato tillage was lower than crop rotation, it changed by 1,48-2,65 on the tillage layer and 1,17-1,48 mg P_2O_5 on under tillage layer in the research years. On the constant tillage an average mark of the activity was 45,9% less on 0-50 cm of layer than the potato on the I scheme, 35,1% less than the II scheme. The mathematic analyses show that the activity in the soils under a potato changed by 1,68-2,50 on 0-50 cm of layer on the 1st scheme, 1,26-2,28 and 0,77-1,50 mg P_2O_5 on the constant tillage on the 2nd scheme, a variation coefficient changed by 17,02-23,02; 10,22-17,76 and 19,86-28,70%.

Despite the garlic keeps plant residues in a few quantities after itself, its phitonsid feature plays sanitary role in prevention of some pathogen fungus. The garlic itself is used in some diseases treatment widely as valuable medicine plant. From this point being entered of the garlic the crop rotation is useful on ecological side. One maximum in the soils under the garlic was noted in June. This period is related with the formation and preparation of the product for harvesting as in the potato. Beginning from July entering of the plant residues the soil was conditioned with the activity reduction gradually. The phosphatase ferment activity in the soils under garlic was less in comparison with the other plants at the research period and it was 1,32-2,39 mg P_2O_5 on tillage layer, 0,89-1,74 mg P_2O_5 on under tillage layer, the activity was very low on the constant tillage, accordingly 0,46-1,0 and 0,37-0,88 mg P_2O_5. It is seen that phosphatase ferment activity reduced 2,3 times during growing of the garlic on the constant tillage. The mathematic analyses show that the activity in the soils under the garlic according to the phosphatase activity was 1,74±0,098 mg P_2O_5 on the tillage layer, 0,74±0,053 mg P_2O_5 on the constant tillage and less on the under tillage layer, a variation coefficient changed on the constant tillage in a large interval.

The phosphatase ferment activity was 2,46-3,01on the tillage layer (0-25 cm) and 1,85-2,48 mg P_2O_5 on under tillage layer (25-50 cm) on the version of white-head cabbage+tomato at the vegetation period (March-October). Two maximums for an activity on the 1st scheme were observed in June-at the period of the white-head cabbage formation, in August-at the period of ripening of the tomato product. We can come to such a conclusion that an activity under the tomato on the II scheme vibrated 2,03-2,72 mg P_2O_5 on 0-50 cm of layer. On maximum on the constant tomato tillage-was observed in July, an activity in other months is gradually reduced till October and an activity changed by 1,11-2,13 on the tillage layer, 0,73-1,11mg P_2O_5 on under tillage. An activity was 1,36-2,73 on tillage layer in the soil under constant white-head cabbage and it changed by 1,10-2,02 mg P_2O_5 on under tillage layer. The mathematic analyses show that the phosphatase ferment activity was 2,72±0,056 mg P_2O_5 on the tillage layer on the version of white head cabbage+tomato, 2,20±0,065 on under tillage layer, 2,66±0,069 and 2,19±0,089 under the tomato on the 2nd scheme, 1,91±0,147 mg P_2O_5 and 1,48±0,105 under the white-head cabbage on the constant tillage, 1,70±0,102 and 0,79±0,056 mg P_2O_5 under the tomato, a variation coefficient changed by 8,30-30,93% on the research version.

The phosphatase ferment activity changed by 2,36-3,61mg P_2O_5 on the tillage layer and 1,80-2,69 on the under tillage horizon, 1,45-2,40 mg P_2O_5 on 0-50 cm of layer on the constant tillage in the soils under the vegetable bean at the vegetation period. One maximum under the vegetable bean was observed in June, it can be explained with the vegetable bean development phase. The mathematic calculations show that the phosphatase coefficient activity changed by 2,14-3,25 mg P_2O_5 on the crop rotation, 1,53-2,31mg P_2O_5 on the constant tillage, a variation coefficient changed by 9,14-27,60% in the versions of the vegetable bean.

The soils under the plants growing in the irrigative grey-brown soils can be drawn up in the following sequence according to the phosphatase ferment activity: a lucerne > vegetable bean > white head cabbage + tomato > water-melon > tomato > potato > garlic.

Dynamics of the phosphatase ferment activity in the irrigative grey-meadow soils. The phosphatase ferment activity that performs phosphor organic combinations mobilization in the soil changed dynamically depending on the plants development phase, soil-ecological condition in March-October. The activity was 0,36-3,11 mg P_2O_5 on 0-50 cm of layer in the crop rotation, 0,11-0,38 mg P_2O_5 on the constant tillage. An activity under the annual lucerne on 0-50 cm of layer vibrated by 1,12-2,37, 1,86-2,50 mg P_2O_5 under the two-year lucerne, and two maximums were observed in each versions. The mathematic calculations show that an activity changed by 1,95±0,75 mg P_2O_5 on the tillage layer, 1,64±0,148 mg P_2O_5 on the under tillage layer, a variation coefficient changed by 13,40-28,67% under the annual lucerne.

An activity under the cucumber changed by 0,97-1,15 mg P_2O_5 on the tillage layer, 0,37-0,56 mg P_2O_5 on the under tillage, an average mark of the activity was 0,51units (68,92%) more than the constant tillage. The mathematic analyses show that an activity under the cucumber on 0-05 cm of layer changed by 0,17-1,09 mg P_2O_5, the variation coefficient changed by 15,20-53,67%.

An activity in the soils under the tomato on 0-50 cm of layer changed by 0,56-1,00 mg P_2O_5, an average mark of the activity was 0,51 (60,3 %) more than the constant tillage. One maximum according to the activity in the versions of the cucumber and tomato was noted in July. It is obvious that a gradual reduction of the activity till the vegetation end is shattering of the plants residues entering the soil by microorganisms and entering of mobile phosphorus into the soil. An increase of the activity distinguishing from other plants growing under the lucerne is related with the exhaustion of the phosphorus resources and fulfillment of the phosphorus combinations shattering. The statistic analyses show that an activity under the tomato on 0-25 cm of layer was 0,89±0,058; 0,68±0,059 on 25-50 cm of layer; 0,30±0,052 and 0,23±0,034 mg P_2O_5 on the constant tillage.

So, the getting conclusions show that phosphatase ferment activity is connected with the biology and development phase of the growing plants.

Dynamics of the phosphatase ferment activity in the irrigative alluvial meadow-forest soils. An activity under the annual lucerne+barley changed by 0,72-1,32 on the tillage layer, 0,55-1,05 on the under tillage layer, 0,97-1,55 and 0,80-1,32 mg P_2O_5 under the two-year lucerne and two maximums according to the activity were observed in July and October in the irrigative alluvial meadow-forest soils. The mathematic analyses show that the phosphatase ferment activity changed by 0,76-1,29 mg P_2O_5, a variation coefficient changed by 20,72-31,97 % in the soils under the lucerne.

An activity in the soils under the onion was low, 0,47-0,73 on the tillage layer, 0,25-0,52 mg P_2O_5 on the under tillage layer, one maximum for an activity was observed in June. It is obvious that an exhaustion of phosphor organic combinations in the soil was a reason for an increase of phosphatase ferment activity at the period of the onion formation and its preparation for harvest. An activity on the tillage layer under the constant onion was 0,27-0,47 mg P_2O_5 and 0,14-0,27 mg P_2O_5 on the under tillage layer and maximum activity was noted in June. The mathematic analyses show that this indicator under on onion changed by 0,62±0,029 on the tillage layer, 0,36±0,028 on the under tillage layer, 0,34±0,0025 and 0,19±0,016 mg P_2O_5 on the constant tillage, a variation coefficient changed by 18,85-32,65% on each version.

The phosphatase ferment activity in the soils under the cucumber was 0,60-0,98 on the tillage layer, 0,39-0,72 on the under tillage layer, 0,48-0,66 and 0,26-0,47 mg P_2O_5 on the constant tillage, one maximum for an activity was observed in July. This indicator on the constant cucumber tillage was 0,23 less and 0,22 units less on the under tillage layer than crop rotation. The mathematic analyses show that an activity vibrated by 0,53-0,82 mg P_2O_5 under the cucumber, 0,33-0,58 mg P_2O_5 on the constant tillage and a variation coefficient vibrated by 21,47-28,79%.

The phosphatase ferment activity under the whitehead cabbage was 0,72-1,14 mg P_2O_5 on the tillage layer, 0,39-0,60 mg P_2O_5 on the under tillage layer in the research years, an activity got a maximum mark comparatively in June (1,14 mg P_2O_5) and reduced till October gradually. The phosphatase ferment activity changed in an interval of 0,39-0,61 mg P_2O_5 on 0-50 cm of layer under the tomato in the research years, one maximum was in July, it was noted at the period of mass ripening of the tomato plant. An average of the phosphatase ferment mark in the version of green fodder+tomato was 0,26 units (34,7%) more than the constant tomato version. The mathematic analyses give a reason to come to a conclusion that the phosphatase ferment activity on 0-50 cm of layer changed by 0,58-0,93 mg P_2O_5 on the version of green fodder+tomato and 0,38-0,60 mg P_2O_5 under constant tomato and a variation coefficient changed by 21,22-31,15% in each version by getting the highest mark on the constant tillage.

So, the researches show that a phosphatase ferment activity changed by 0,47-1,55 on the tillage layer under an onion and the lucerne, tomato, cucumber, white-head cabbage, 0,25-1,32 mg P_2O_5 on the tillage layer, 0,14-0,68 mg P_2O_5 on the under tillage and tillage layers under an onion, tomato, white-head cabbage, cucumber on the constant tillage.

Dynamics of the phosphatase ferment activity in the irrigative gleyey-yellow soils. The phosphatase ferment activity on the tillage (0-25 cm) and under tillage layers (0-50 cm) under the plants growing in the research years changed by 0,79-3,17 on the vegetable-leguminous plants growing scheme in the leaching gleyey-yellow soils, it changed by 0,34-2,20 mg P_2O_5 on the constant tillage. An activity under the tomato was 1,65-2,41mg P_2O_5 on the tillage layer and 1,21-1,84 mg P_2O_5 on the under tillage layer at the vegetation period in the research years, one maximum was noted in July. It is obvious that at the same period because of the exhaustion of the phosphorus resource in the soil, an intensity of the phosphatase ferment increased to shatter phosphor organic combinations and because of the need for phosphorus mobile forms for formation of the trunk, fruits of the tomato and an activity got a maximum mark (2,41mg P_2O_5), an activity occurred in a reducing direction till the end of vegetation again. This indicator was some less on the constant tomato tillage, an activity changed 0,39-2,06 mg P_2O_5 on the tillage and on the under tillage layer, an activity was 59,2% more than under tillage layer . The mathematic calculations show that an activity was 1,32-2,14 mg P_2O_5 on 0-50 cm of layer under the tomato, 0,58-1,66 mg P_2O_5 on the constant tillage, a variation vibrated by 17,02-32,02%, by changing in a large interval on the constant tillage.

The phosphatase ferment activity on the version of white head cabbage+maize changed by 2,17-2,55 mg P_2O_5 on the tillage and 1,62-2,18 mg P_2O_5 on the under tillage layer in the research years, two maximums were noted in June and September. It is obvious that the June maximum is connected with the need of the maize for phosphorus as a food source in connection with the maize development phase for the cabbage formation at the period of ending of the cabbage development phase. An average mark of the activity on the constant tillage was 55,6% less than the crop rotation. As planting of the same plant in one area for 5 years influenced on soil ecological parameters, negatively the showed a negative effect on phosphatase ferment activity and was reason for reduction of the activity year by year. An activity was 0,50-1,33 mg P_2O_5 on the tillage and under tillage layer in constant white head cabbage at the vegetation period and one maximum was noted in June. An activity in the soils under the constant maize was 0,72-1,28 on the tillage layer and 0,57-1,11 mg P_2O_5 on the under tillage and one maximum was observed in September. The mathematic analyses show that the phosphatase ferment activity vibrated 1,83-2,44 mg P_2O_5 on the tillage and under tillage layers on the version of the white head cabbage+maize, 0,80-1,11 mg P_2O_5 under white head cabbage on the constant tillage, 0,76-1,08 mg P_2O_5 under the maize, a variation coefficient vibrated by 10,56-31,01% on the research versions.

An activity of the phosphatase ferment in the soils under the onion was the least in comparison, changed by 1,59-2,26 mg P_2O_5 on the tillage layer (0-25 cm) and 0,79-1,51 mg P_2O_5 on the under tillage layer (25-50 cm) and one maximum was observed in June. An activity in the soils under the onion was 0,42-0,96 on the tillage layer and 0,34-0,74 mg P_2O_5 on the under tillage layer on the constant tillage and an average mark of the activity on the crop rotation was 0,9 units (59,6%) more than the onion on the constant tillage. The mathematic analyses showed that the phosphatase ferment activity changed by 1,87±0,076 mg P_2O_5 on 0-25 cm of layer on the crop rotation, 1,15±0,081mg P_2O_5 on the under tillage layer, 0,68±0,060; 0,54±0,050 mg P_2O_5 on the constant tillage, a variation coefficient changed by 14,74-33,45% on the two versions.

An activity under the vegetable bean was 2,22-3,17 on the tillage layer (0-25 cm) and 1,57-2,55 on the under tillage layer (25-50 cm), changed by 1,43-2,20 and 0,72-1,35 mg P_2O_5 on the constant tillage at the vegetation period, one maximum was observed in July. The soils under the plants entering the crop rotation can be formed up by the following sequence for the phosphatase ferment activity: vegetable bean > white head cabbage+maize > tomato > onion.

The soils of the subtropic zone are ensured with the phosphatase ferment activity little, a reason for it was soilsforming rocks, their using direction (Orudzheva, 2009). V. T. Mamedzade (2004) shows that provision of the soils in the Lankaran zone with the mobile phosphorus to a high degree was a reason for being low of the phosphatase ferment activity. The soil type's comparison shows that a weaker activity of the phosphatase ferment was in the irrigative alluvial meadow-forest soils.

3.1.4 Catalase Ferment Activity

The catalase ferment decomposes hydrogen peroxide into water and molecular oxygen. Hydrogen peroxide is formed as a result of the organic matters oxidizing in different biochemical reactions and animate organisms respiration. It is seen that a main function of catalase in soil is rendering harmless by decomposing hydrogen peroxide that is toxic for the animate organisms.

While possessing oxygen in the environment the hydrogen peroxide which is toxic during oxidizing in the microbic cells is formed, the catalase ferment that is secreted by aerob microorganisms renders harmless this matter by decomposing (Gasimova, 1985). In the soils with the unnecessary humidity a reason for the catalaza ferment activity decrease is domination of microorganisms that don't secret the catalase ferment as a result of metabolism under an anaerob condition (Kaziyev and et. al., 2004).

The catalase ferment activity reflects the soils fertility level in itself and it is a diagnostic indicator of the soil biological activity (Abasov, 1980; Orudzheva, 2009). pH is 7,5-8,0 for an optimal activity of the catalaza ferment (Zubkova, 2001), a reason for being little of the catalaza ferment activity is playing of limiting a role of the acid environment (Kazeyev and et.al., 2002). Determination of the catalase ferment activity in the evolution of soils that subjected to degradation under an antropogen influence gives a good result. Study of the variation of the catalase ferment activity and seasonal dynamics of the humus quantity in a space frame show that the catalase ferment is subjected to the change to the same degree in time, but the humus quantity is subjected to the change in a space (Dadenko, 2005; 2006). The catalase ferment activity in the Lankaran zone is a main diagnostic indicator of the anaerob processes occurring in the soils (Orudzheva, 2006; Mamedzade, 2004). The catalase ferment activity is higher on the upper layers than the low layers, a variation coefficient is more than invertase ferment, because an activity of invertase ferment depends on stabber humus (Shakuri, 2004). The catalase ferment activity is less than the virgin soils in ploughing of soils, as a result of use of the soils under the agricultural plants the change of the catalase ferment activity is arrested one's attention little (Kazeyev and et. al., 2004).

Dynamics of the catalase ferment activity in the irrigative grey-brown soils. The researches show that the catalase ferment activity change under the vegetable and fodder plants in the grey-brown soils characteristic for the Absheron region conveys a seasonal character. The catalase ferment activity on the crop rotation in the Absheron irrigative grey-brown soils has been learnt by F.G. Abbasov (1980) and N.H.Orudzheva (2006; 2009), but under olive-tree on dynamics it is studied by N.I. Jumshudova (1987) and others.

The catalase ferment activity under the lucerne was higher on the tillage layer (AI^{I}_{a}) than on the under tillage layer (AI^{II}_{a}) and it is changed by 8,1-17.8 cm^3 O_2 on 0-50 cm of layer. An activity in the soils under an annual lucerne+barley changed by 9,7-16,7 on the tillage layer and 8,1-14,6 cm^3 O_2 on the under tillage layer in March-October. An activity under the two-year lucerne it was comparatively higher, it was 11,3-17,8 and 9,6-16,1 cm^3 O_2 on the tillage and on the under tillage horizon, two maximums for an activity were observed in August and October, the least activity was in March. The mathematic calculations show that the catalase ferment activity on 0-50 cm of layer changed by 11,0-14,4 under an annual lucerne+barley, 12,8-15,7 cm^3 O_2 under the two-year lucerne, a variation coefficient changed by 17,45-21,43% on both versions.

The catalase ferment activity under a watermelon on the first scheme changed by 10,0-16,2 on the tillage layer, 8,7-13,9 on the under tillage layer, 8,7-13,9 on the under tillage layer, 8,5-13,8 and 6,3-10,2 cm^3 O_2 on the second scheme, two maximums for an activity were noted in August and October. The catalase ferment activity on the constant watermelon tillage formed 5,2-8,6 on the tillage layer and 4,5-8,0 cm^3 O_2 on the under tillage horizon and an average of the activity was 5,6 times less than the 1st scheme, 3,1 times less than the 2nd scheme. The statistic analyses show that an activity in the soils under the watermelon on the tillage layer on the first scheme was 13,6±0,535 cm^3 O_2, 11,3±0,610 cm^3 O_2 on the 2nd scheme, 7,5±0,406 cm^3 O_2 on the constant tillage, 11,7±0,460 on the under tillage, 8,9±0,386 and 6,7±0,417 cm^3 O_2 and a variation coefficient changed on the constant tillage in a large interval.

An activity in the soils under a garlic was less than the grown other plants, it changed by 8,6-13,3 on the tillage layer and 6,9-10,4 cm^3 O_2 on the under tillage horizon, two maximums for an activity was 13,3 cm^3 O_2 in June and 11,6 cm^3 O_2 in October. The catalase ferment activity in the soils under the garlic on the constant tillage changed by 6,9-8,6 cm^3 O_2 on the tillage layer and 4,8-7,7 cm^3 O_2 on the under tillage horizon at the vegetation period. An average mark of the activity on the crop rotation was 2,8 unit more than the constant garlic tillage. The mathematic calculations show that a change interval of the activity under the garlic on 0-50 cm of layer on the crop rotation was 8,4-11,6; 6,1-7,9 cm^3 O_2 on the constant tillage, a variation coefficient was 14,92-26,24%.

The catalase ferment activity on the white head cabbage+tomato version was 9,8-15,2 on the tillage layer was 9,8-15,2 cm^3 O_2 and 8,5-12,1 cm^3 O_2 on the under tillage horizon, two maximums for an activity was in June (13,7 cm^3 O_2) and in October (12,9 cm^3 O_2). An activity under the tomato on the second scheme changed by 7,2-12,7 cm^3 O_2 on the tillage and under tillage layers, two maximums were observed in August (12,0 cm^3 O_2) and in October (11,5 cm^3 O_2). An activity on the constant tomato tillage changed by 5,8-9,9 cm^3 O_2 on 0-50 cm of layer at the vegetation period, two maximums for an activity were noted in August (9,9 cm^3 O_2) and in October (9,1 cm^3 O_2). An activity in the version of the whitehead cabbage on the tillage layer was 32,2% more than constant whitehead cabbage and 30,6% more than the constant tomato. This shows alternation of the plants in this crop rotation, increase of the biological activity on the constant tillage phone and increase of the microbiological process intensity. The statistic analyses show that an activity was 13,3±0,469 on 0-25 cm of layer in the version of the white head cabbage+tomato on the 1st scheme, 11,3±0,449 under the tomato on the 2nd scheme, 9,1±0,481 under the tomato on the constant tillage, 9,1±0,505 cm^3 O_2 under the whitehead cabbage and it was more than under tillage layer. A variation coefficient changed by 14,22-24,98% in the investigative version.

The catalase ferment activity in the version of the vegetable bean changed by 10,1-16,6 on the tillage layer and 7,8-14,3 on under tillage horizon, 7,9-12,7 and 5,0-9,7 cm^3 O_2 on the constant tillage, an average mark of the activity was 29,0 less than the crop rotation. Two maximums for an activity were noted in August and in October. The mathematic analyses show that an activity under the vegetable bean changed by 10,8-14,8 cm^3 O_2, 7,4-11,2 cm^3 O_2 on the constant tillage, a variation coefficient changed by 15,67-27,03% .

The higher activity of the catalase ferment under the plants grown in the irrigative grey-brown soils was observed under the lucerne, vegetable bean, and few garlics. The least activity of the catalase ferment under the growing plants was in March, the higher activity was in October, two maximums were noted in July, October or August, October depending on the plants development phase.

Dynamics of the catalase ferment activity in the irrigative grey-meadow soils. The catalase ferment activity in the irrigative grey-meadow soils of the arid subtropic zone was learnt by C.A Hajiyev (2000), I.M.Abduyev (1987), R. A. Agabayova (1984) and others.

The catalase ferment activity in the irrigative grey-meadow soils vibrated by 1,7-9,8 cm^3 O_2 by changing dynamically on the crop rotation and on the constant tillage. An activity under two-year lucerne was 6,8-9,8 on the tillage layer, 3,6-7,4 cm^3 O_2 on the under tillage layer and an average mark of the activity was 0,9 units more than the one year lucerne. Two maximums according to the activity under the lucerne are noted in August and October. The statistic calculations show that an activity on 0-50 cm of layer under an annual lucerne was 4,2-7,5 and 4,8-8,8 cm^3 O_2 under the two-year lucerne.

An activity under the cucumber changed by 3,9-7,5 cm^3 O_2 on 0-50 cm of layer, an average value of the activity was 2,6 units (46,43%) more than the constant cucumber. Two maximums under the cucumber were noted in July (8, 2 cm^3 O_2) and in October (6,8 cm^3 O_2). An activity on the durable cucumber tillage changed by 1,9-3, cm^3 O_2 on 0-50 cm of layer. The mathematic statistic analyses show that an activity on on 0-25cm of layer under the cucumber was

6,5±0,428 and 4,7+0,405 cm^3 O_2 on 25-50 cm of layer, a variation coefficient changed by 20,80-27,55 %.

The catalase ferment activity was less in the irrigative grey-meadow soils than irrigative grey-brown soils of the arid subtropic zone. It is obvious that the environment salinity limits an increase of microorganisms possessing an ability of the catalase ferment secretion in order to decompose hydrogen peroxide having a toxical character in the soil and as a result it reduces the activity.

Dynamics of the catalase ferment activity in the irrigative alluvial meadow-forest soils. Six-field vegetable-fodder tillage scheme has been tested for learning of the catalase ferment activity in dynamics in the irrigative alluvial meadow-forest soils. A seasonal change of the catalase ferment activity in the irrigative alluvial meadow-forest soils was reflected in N.H. Orudzheva's (2002; 2009) works. The catalase ferment activity on the tillage horizon (0-25 cm) changed by 6,1-9,4 cm^3 O_2 and 4,8-8,8 cm^3 O_2 on the under tillage horizon (25-50cm) at the research period, two maximums were observed in August and in October. An activity changed by 4,8-8,1 cm^3 O_2 on the tillage and under tillage horizons under an annual lucerne+barley, 5,8-9,4 cm^3 O_2 under the two-year lucerne. The mathematic analyses show that an activity in the soils under the lucerne was 5,8-8,4 cm^3 O_2 on 0-50 cm of layer, a variation coefficient changed by 14,78-18,13% .

The catalase ferment activity under an onion was 5,2-6,8 on 0-50 cm of layer at the research period, 5,6-7,1 on the tillage horizon and 4,8-6,5 on the under tillage horizon, on the constant tillage it was 4,3-5,8: 4,5-6,1 and 3,9-5,4 cm^3 O_2, two maximums for an activity were noted in June and in October. The statistic calculations show that an activity was 6,1±0,189 on the tillage horizon in the soils under the onion on the crop rotation, 5,3±0,255 cm^3 O_2 on the durable tillage, a variation coefficient changed by 12,48-21,09% on every version.

An activity was 5,2-7,9 on the tillage horizon and 4,6-6,9 cm^3 O_2 on the under tillage horizon in the soils under the cucumber at the vegetation period, two maximums were noted in August (7,9 cm^3 O_2) and in October (6,3 cm^3 O_2). An activity on the cucumber durable tillage was less than the crop rotation, it changed by 4,8-6,6 and 4,1-5,9 cm^3 O_2 on the under tillage horizon at the vegetation period. On the basis of the statistic analyses the catalase ferment activity in the soils under the cucumber was higher than under tillage layer, it was 6,5±0,285 on the tillage horizon, 5,6±0,264 cm^3 O_2 on the durable layer. A variation coefficient changed on the constant tillage in a larger interval in comparison with the crop rotation.

The activity in the version of the whitehead cabbage was 6,2-8,1 on the tillage layer and 4,9-6,8 cm^3 O_2 on the under tillage horizon at the research period, two maximums for the activity were noted in June (7,5 cm^3 O_2 on 0-50 cm of layer) and in October (6,7 cm^3 O_2 on 0-50 cm of layer). The activity under the constant whitehead cabbage was 5,0-6,7 cm^3 O_2 on the tillage layer, 4,2-6,3 cm^3 O_2 on the under tillage layer. The mathematic analyses show that the catalase ferment activity under white -headed cabbage was higher than the durable layer and it was 5,7-7,1 cm^3 O_2 on the tillage and under tillage horizons, a variation coefficient changed by 13,10-15,32% by being less than the constant layer.

In the version of green fodder+tomato version the catalase ferment activity was 6,4-8,6 cm^3 O_2 on 0-50 cm of layer by reducing along the profile at the vegetation period, it was 6,9-8,9 cm^3 O_2 on the tillage layer and 5,9-8,2 cm^3 O_2 on the under tillage layer, two maximums for activity observed in June (8,6 cm^3 O_2) and in October (8,2 cm^3 O_2). An activity in the soils under the constant tomato was less than the crop rotation changing by 5,0-6,5 on the tillage layer and 4,1-6,1 cm^3 O_2 on the under tillage horizon. The mathematic statistic calculations show that in the version of green fodder+tomato being an activity higher than the soils under the constant tomato it was 7,1-8,3 cm^3 O_2 on 0-50 cm of layer, a variation coefficient changed by 12,30-12,90%.

So, the maximum activity under the lucerne, cucumber, tomato was in August and October, in the versions of the onion, white head cabbage, green fodder +tomato it was in June and in October. The less activity under the growing plants was observed in March. It is obvious that a low temperature conditioned the formation of high humidity anaerob situation, as a result it renders an ingibitor effect on catalase ferment activity.

Dynamics of the catalase ferment activity in the irrigative gleyey-yellow soils. The catalase ferment activity in the irrigative gleyey-yellow soils was learnt in the 5-field vegetable-leguminous crop rotation scheme. The catalase ferment activity in the soils under the tomato was 2,7-5,2 on the tillage layer and 1,6-4,1 cm^3 O_2 on the under tillage horizon at the season period, two maximums for an activity were noted in August (5,2 cm^3 O_2) and in October (4,8 cm^3 O_2). The catalase ferment activity in the soils under the constant tomato changed by 1,7-3,8 and 1,5-3,1 cm^3 O_2 on the under tillage layer and an activity on the crop rotation was 22,2% less than the tomato. The mathematic analyses show that an activity on the crop rotation was 2,9-4,4 on 0-50 cm of layer, 2,3-3,3 cm^3 O_2 on the durable horizon, a variation coefficient changed by 23,46-32,03% on both versions.

The catalase ferment activity in the version of the white head cabbage+maize changed by 4,5-6,2 cm^3 O_2 on the tillage layer and 2,9-4,6 cm^3 O_2 on the under tillage horizon at the vegetation version, three maximums for an activity was noted in June (5,8 cm^3 O_2), in August (5,4 cm^3 O_2) and in October (6,2 cm^3 O_2).

A unit was much in the soils under the constant white-headed cabbage. An activity changed by 2,7-4,7 on 0-50 cm of layer in the soils under the constant whitehead cabbage, 2,1-4,1 cm^3 O_2 under the maize in the research years. On the basis of the statistic calculations it was determined that an activity was 5,2±0,255 on the tillage layer in the version of white head cabbage+maize, 3,6±0,217 on the under tillage layer, 4,5 ± 0,272 under white-headed cabbage on the constant tillage; 3,0±0,242; 3,9±0,149 and 2,8±0,228 cm^3 O_2 under the maize. A variation coefficient was 17,75-29,33% in the largest interval on the constant tillage.

The catalase ferment activity in the soils under the onion changed by 2,7-4.9 on the tillage layer and 2,1-3,5 cm^3 O_2 on the under tillage horizon at the research period, two maximums for an activity were noted in June (4,9 cm^3 O_2) and in October (3,4 cm^3 O_2) . The catalase ferment activity on the constant onion tillage was less than the crop rotation, it changed by 1,7-2,9 and 1,4-2,6 cm^3 O_2 on the tillage and under tillage horizons. A consequence of the mathematic analyses shows that an activity in the soils under the onion changed by 1,7-2,1 cm^3 O_2 on 0-50 cm of layer on the constant tillage, a variation coefficient vibrated in the larger interval in comparison with the crop rotation.

The catalase ferment activity under the vegetable bean changed by 4,1-6,9 cm^3 O_2 on the under tillage horizon and 3,2-5,2 cm^3 O_2 on the under tillage horizon at the research period, two maximums for an activity were observed in August and in October. The catalase ferment activity on the area of the constant vegetable bean was 23,1% less in comparison with the crop rotation, it vibrated by 3,3-5,0 cm^3 O_2 on the tillage layer and 3,1-4,4 cm^3 O_2 on the under tillage at the vegetation period. Mathematic working for the catalase ferment activity in the soils under the vegetable bean shows a change of the activity was by 3,9-6,0 cm^3 O_2 on the crop rotation, 3,5-4,6 cm^3 O_2 on the durable tillage, a variation coefficient was 14,68-22,70%. The higher activity of the catalase ferment under the vegetable plants grown in the irrigative gleyey-yellow soils under the vegetable bean and the less one under the onion. An activity was enough high in the version of the white headed cabbage +maize which in interval plant included. The growing plants can be drawn up in the following sequence for the catalase ferment activity: vegetable bean > white head cabbage+maize > tomato > onion. Depending on the growing plants biology two maximums for an activity was noted in June and in October or in August and in October, the least activity was observed in March.

The catalase ferment activity under different fodder and vegetable plants in the grey-brown, grey-meadow, alluvial meadow-forest and gleyey-yellow soils under irrigative condition was learnt in dynamics, an activity change was defined depending on plants biology, soils-ecological parameters. The higher activity of the catalase ferment was found in the irrigative grey-brown and the least one is found in the gleyey-yellow soils. It is obvious that being high of the catalase ferment activity calcareous along the profile, in the irrigative grey-brown soils an ecological factor, acid environment and anaerob condition which limited in the gleyey-yellow soils.

3.1.5 Dehidrogenase Ferment Activity

Oxidizing-reduction processes play an important role in the soil fertility formation. This process is performed by oxireductases. From this point hydrogen decomposition from organic matters, this is dehydrogenase ferment which performs dehydrogenizing process rouses interest. Substrate of dehydrogenizing process can be different carbohydrates, organic acids, amino acids, spits, humin acids and etc. Hydrogen that is decomposed as a result of hydrogenising can be entered the air oxygen (aerobe dehydrogenase) or organic combinations as chin on (anaerobe dehydrogenase). So, depending on soils condition the dehydrogenase ferment fulfils its function under aerobe and anaerobe condition. Reduction of nitrate to ammoniac posses through the definite stages. Hydrogen participates in each stage. Hydrogen which is obtained from organic combination is carried by dehydrogenase ferment. Carbohydrates that are donor for hydrogen can be salts of the different organic acids and components of soil humus (Khaziyev, 2005).

Dehydrogenase ferment in the soil effects on carbohydrates and organic acids quickly gets hydrogen from oxidizing organic matter and performs hydrogen carrier function. A role of the dehydrogenase ferment is great in decomposition of the plant residues and their overturn in soil. According to K. A. Kozlov's (1970) idea the dehydrogenase ferment activity is necessary to be considered not only a product of microflora activity, but also a product of other representatives of ecophone. Some authors note a special role of the dehydrogenase ferment activity in evaluation of the biological activity and soil fertility (Kuprevich and et. al., 1966). Studying the dehydrogenase ferment activity in the main soil types spreaded over Azerbaijan vertical zoning in dynamics shows that maximum activity possesses in spring and autumn, the least one in summer (Aliyev, 1978; Aliyev and et. al., 1979).

Dynamics of the dehydrogenase ferment activity in the irrigative grey-brown soils. The dehydrogenase ferment activity in the irrigative grey-brown soils in Absheron was learnt by some authors, they show that an activity possesses dynamical character depending on plants biology (Abasov, 1980; Babayev and et al., 2009; Orudzheva, 2009).

The dehydrogenase ferment activity in the version of the lucerne+barley on the crop rotation of the 6-field vegetable-fodder in the irrigative grey-brown soils was 6,32-7,54 on the tillage layer (0-25 cm), 3,87-6,06 on the under tillage horizon, 6,82-9,49 and 4,91-7,71 mg TFF (trifenilfarmazon) under the two-year lucerne at the research period. An average mark of the activity under the two-year lucerne was 20,5% more than the annual lucerne+barley version and two maximums were observed in June and in October. Keeping and activity under the lucerne in a higher level is connected with the lucerne biology together with the soil-ecological condition. Thanks to the increase of the microorganisms quantity on one hand under the lucerne roots on the other hand under lucerne roots on the other hand under lucerne, the dehydrogenase ferment that they secret was a reason for increase of the activity in the environment. The mathematic analysis shows that an activity on 0-50 cm of layer changed by 4,91-8,58 mg TFF for the dehydrogenase ferment activity in the soils under the lucerne, a variation coefficient changed by 10,29-19,06%.

The dehydrogenase ferment activity in the soils under the watermelon changed by 5,31-8,14 on the tillage layer and 3,42-5,34 mg TFF on the under tillage layer in the research year. An activity changed by TFF on the tillage layer (0-25 cm) 3,77-5,34 mg TFF on the 1st scheme and was higher than the 2nd scheme at the vegetation period, two maximums for an activity were period, two maximums for an activity were observed in June and October. The dehydrogenase ferment activity on the constant water-melon tillage changed by 2,50-4,32 on the tillage layer and 1,80-2,77 mg TFF on the under tillage horizon at the vegetation period. The mathematic analyses showed that an activity under the watermelon changed by 6,84±0,221, 4,64±0,139 on the under tillage horizon on the 2nd scheme: 3,12±0,189 and 2,28±0,118 mg TFF on the constant tillage, a variation coefficient changed by 11,61-24,39% during a season.

The dehydrogenase ferment activity in the soils under the potato vibrated by 4,18-5,58 on the tillage layer on the 1st scheme and 2,62-3,40 on the under tillage horizon 3,58-5,16 and 2,03-3,19 on the 2nd scheme and two maximums for an activity was observed in June and October. An activity on the constant potato tillage changed 1,83-2,7 mg TFF at the vegetation period. The statistic calculations show that an activity was 2,65±0,125 on the tillage layer and 1,62±0,091 mg TFF on the under tillage layer by varying in the largest interval, the variation coefficient was in an interval of 18,07-22,7%.

The activity under a garlic changed by 3,81-5,38 on the tillage layer and 3,38-4,66 mg TFF on the under tillage layer two maximums for an activity were noted in June (5,38 mg TFF) and in October (4,12 mg TFF). The activity was kept in a higher level in the soils for possessing of garlic in the plot in March. The activity changed by 2,02-2,82 on the tillage layer and 1,88-2,40 mg TFF on the constant garlic tillage at the vegetation period . The mathematic statistic calculations show that an activity changed by 3,78-4,71 on 0-50 cm of layer in the crop rotation, 2,12-2,38 mg TFF on the constant tillage, a variation coefficient changed by 13,00-19,07% in the soils under the garlic.

The activity on the tillage horizon was 4,21-6,16 under the version of white head cabbage+tomato and 3,00-5,45 on the under tillage layer, it was accordingly 4,62-6,10 and 3,67-5,15 mg TFF in the soils under the tomato on the 2nd scheme at the vegetation period. Two maximums were observed under the version of the whitehead cabbage and on the 2nd scheme in July and October. Because of possessing of the white head cabbage in the plot the dehydrogenase ferment activity was kept in a higher level in May. The activity under the constant white head cabbage changed by 2,62-4,41 on 0-50 cm of layer and 2,80-3,9 mg TFF under the constant tomato at the vegetation period. The mathematic analyses show that changed by 4,13-5,44 on 0-50 cm of layer under the version of white head cabbage+tomato; 4,40-5,40 under the tomato version on the 2nd scheme; 2,87-3,69 on the constant tomato tillage and 3,11-4,31 mg

TFF under the white head cabbage, the variation coefficient changed by 10,45-23,79% under the same versions.

An activity under the vegetable bean changed by 5,53-7,80, 3,75-5,69 on the under tillage layer and it was higher than the constant tillage. The mathematic analyses show a vibration of the activity by 4,43-6,83 under the vegetable bean 3,53-5,35 mg TFF on the constant tillage and the variation coefficient by 11,80-22,59%.

So, the higher activity of the dehydrogenase ferment in the irrigative grey-brown soils was observed under the lucerne, vegetable bean, the least one under the garlic. Two maximums under the plants were noted in June and October or in July and October. The dehydrogenase ferment activity was enough despite the temperature was low and humidity was much under the lucerne potato, garlic and whitehead cabbage in March, this is connected with the plants development phase at the same period. The activity was higher on the tillage layer than on the under tillage horizon, in the crop rotation than the constant tillage.

Dynamics of the dehydrogenase ferment activity in the irrigative grey-meadow soils. The dehydrogenase ferment activity in the irrigative soils was leant by some authors (Abduyev, 1987; Agabayova, 1984; Hajiyev, 2000; Orudzheva, 2009). The dehydrogenase ferment activity vibrated by 3,81-6,10 on 0-50 cm of layer in the crop rotation; 1,58-3,68 mg TFF under the plants grown in the irrigative grey-meadow soils. The activity on 0-50 cm of layer under an annual lucerne was 4,34-5,45; 5,06-6,10 under the two-year lucerne; 2,12-3,68 under the constant tomato; 3,81-5,71 under the tomato; 4,12-6,10 under the cucumber, 5,06-6,10 under the two-year lucerne and 1,58-2,74 mg TFF under the cucumber. The statistic analyses show that an activity changed by 4,41-6,00 in the crop rota, 1,43-4,16 mg TFF on the constant tillage, a variation coefficient changed by 7,76-17,44 and 28,82-59,61% under the growing plants.

So, the obtained consequences show that the ferment activity under the agricultural plants in the irrigative grey-meadow soils changed in a large interval.

Dynamics of the dehydrogenase *ferment activity in the irrigative alluvial meadow-forest soils*. An activity under the annual lucerne+barley in the 6-field vegetable fodder crop rotation in the irrigative alluvial meadow-forest soils was 3,56-6,78 on the tillage layer; 2,46-5,00 on the under tillage layer; 3,99-7,03 and 3,30-5,92 mg TFF under the lucerne, two maximums for an activity were observed in June and October. The statistic calculations show that the activity changed by 5,20±0,304 on 0-25 cm of layer under the annual lucerne+barley; 5,59±0,280 mg TFF under the two year lucerne, a variation coefficient changed by 20,47-25,72% by decreasing along the profile.

The activity was 3,69-6,98 on the tillage layer in the soils under an onion at the research period; 1,62-2,36 and 1,52-2,12 mg TFF on the constant tillage at the vegetation period and two maximums were observed in June and October. The mathematic analyses show that an activity was 1,64-5,10 mg TFF on 0-50 cm in the crop rotation and constant tillage, a variation coefficient was 24,58-25,70% by changing on the onion tillage and two maximums were observed in June and October. The statistic analyses show that an activity on 0-50 cm of layer on the constant tillage and crop rotation under the onion was 1,64-5,10 mg TFF, a variation coefficient was 24,58-25,70% by changing on the constant onion tillage in a large interval.

An activity changed by 3,16-5,22 on the tillage horizon and 2,51-3,88 mg TFF on the under tillage layer in the soils under the cucumber, two maximums were noted in June and October. The activity on the constant cucumber tillage changed by 2,0-3,38 on the tillage layer and 1,75-2,76 mg TFF on the under tillage horizon and an average mark of the activity was 32,4% less than the crop rotation. The mathematic analyses show that an activity on 0-50 cm of layer was 2,85-4,11 and 2,00-2,69 mg TFF on the constant tillage, a variation coefficient changed by 19,64-20,71% in the soils under the cucumber.

The activity of the whitehead cabbage was more on the tillage layer than the under tillage horizon, 3,14-5,93 mg TFF on 0-50 cm of layer in the research years, two maximums for an activity were noted in June and October, the microorganisms activity that secreted the dehydrogenase ferment increased the same period. The dehydrogenase activity on the constant whitehead cabbage plant changed by 2,33-4,59 on the tillage layer and 2,19-4,10 mg TFF on the under tillage layer, an average mark of the activity was 1,23 units (28,0%) less than the crop rotation. The mathematic analyses show that the dehydrogenase ferment activity in the soils under the whitehead cabbage changed by 4,69±0,254 on 0-25 cm of layer in the crop rotation; 4,09±0,253 on 25-50 cm of layer, 3,43±0,240 on the constant tillage and 2,89±0,186 mg TFF, a variation coefficient changed in the interval of 21,81-28,15%. The dehydrogenase ferment activity under the green fodder+tomato was 3,91-6,05 on the tillage layer, 3,74-4,94 mg TFF on the under tillage layer at the vegetation period. Two maximums for the dehydrogenase ferment activity under the barley+tomato version for the green forage were observed in June, October, under the tomato in July and October. An average value of the dehydrogenase ferment activity on the constant tomato tillage was 1,75 units (37.2%) less on the tillage layer than the crop rotation, changed by 2,81-4,16 on the tillage layer and 2,49-2,87 mg

TFF on the under tillage layer, two maximums were noted in July and October. The statistic calculations show that the activity changed by 2,52-3,42 mg TFF in a larger interval in comparison with the version of the green fodder+tomato in the crop rotation in the alluvial meadow-forest soils under the constant tomato the variation coefficient was 13,43-19,54% under both versions. The higher activity of the dehydrogenase ferment activity in the irrigative alluvial meadow-forest soils was noted under the lucerne, the least one under the onion, but it takes an interval stand under the cucumber, white head cabbage and tomato. An activity under the plants grown in the crop rotation was higher than the constant tillage, on the tillage layer than the under tillage layer.

Dynamics of the dehydrogenase ferment activity in the irrigative gleyey-yellow soils. The dehydrogenase ferment activity in the soils under the tomato in the crop rotation in the gleyey-yellow soils changed by 12,01-17,01 on the tillage layer, 9,04-13,42 on the under tillage layer, 8,47-13,37 mg TFF on 0-50 cm of layer at the vegetation period. A maximum activity in the soils under the tomato was observed in July. The mathematic analyses show that an activity under the constant tomato was lower than the crop rotation, the variation coefficient on 0-50 cm of layer changed by 14,98-16,58%.

The activity under white head cabbage+maize was 13,05-17,32 on the tillage layer 8,86-14,46 mg TFF on the under tillage horizon, two maximums for an activity were noted in July and October. An activity under the constant white head cabbage changed by 9,99-15,33 mg TFF on the tillage horizon and an average value of the activity was 3,81 units more than the under tillage layer, a higher activity was noted in June. An activity changed by 8,19-12,96 mg TFF on 0-50 cm of layer in the constant maize tillage, two maximums were in June and October (8,63 mg TFF). The mathematic calculations show that an activity under white head cabbage version changed by 14,63±0,523 on the tillage layer, 12,02±0,518 on the under tillage horizon, this indicator was low on the constant tillage, it changed by 11,78±0,540; 7,97±0,537 under white head cabbage; 11,50±0,491under the maize; 8,52±0,48 mg TFF, a variation coefficient changed by 12,88-24,33% under every three versions.

An activity in the soils under the onion was higher on the tillage layer than the under tillage horizon, it was higher in the crop rotation in comparison with the constant tillage. An activity changed by 8,66-12,56 on 0-50 cm of layer and 5,79-9,75 mg TFF on the constant tillage in the research years. The mathematic analyses show that an activity vibrated by 7,99-12,68 on the tillage and under tillage layers 6,18-8,85 mg TFF on the constant tillage, a variation coefficient was 16,80-20,25% in the soils under the onion.

An activity of the dehydrogenase ferment in the soils under the vegetable bean changed by 12,36-17,32 on the under tillage and 8,83-14,89 mg TFF on the horizon at the vegetation period. Two maximums for the dehydrogenase ferment activity under the vegetable bean were observed in July and October, maximum was 1,59 units less than July maximum. An activity in the constant vegetable bean tillage was less than the crop rotation, it changed by 10,04-15,05 on the tillage layer and 7,80-12,77 mg TFF on the under tillage layer. The mathematic analyses show that an activity changed by 12,00-15,30 on 0-50 cm of layer in the crop rotation, 9,96-13,2 mg TFF on the constant tillage, a variation coefficient changed by 10,02-16,45% on both versions. A comparison of the growing vegetable plants for the dehydrogenase ferment activity in the irrigative gleyey-yellow soils shows that a higher activity was under the vegetable bean version, white head cabbage+maize version, the less one was under the onion, the tomato version, the less one was under the onion.

The soils types comparison shows that the irrigative gleyey-yellow soils are distinguished by being higher than irrigative grey-brown, grey-meadow and alluvial meadow-forest soils for the dehydrogenase ferment activity.