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RESEARCHING THE GROWTH INDEXES OF MAIZE HYBRIDS FOR DIFFERENT AMOUNT OF NITROGEN AND AMINO ACID

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Abstract- To study the influence of different amount of nitrogen and amino acid on maize species, a factorial experiment was randomly performed in karaj institute of scion and seed researches in 2008, 2009 and 2010. Nitrogen in three levels of 0,115, and 230 kg per ha, amino acid sprinkling in three levels of 0,4,and 5 lit per ha and the species in three groups from two serotinal sorts of ksc 700 and ksc 704 and a rapidly- growing sort of ksc 500 were contemplated. the results showed that in the process of changes to leaf area, the most index, related to seronital ksc 704. and ksc 700 was the next the LAI of rapidly- growing Ksc 500 was Less than the other two seronitals. The LAI on all sorts got very high by increasing fertilizers of nitrogen (230kg) per ha and 5 lit of amino acid- the most CGR in the seronitals was for KSC 704 and Ksc 700 was the next. And the growth rapidity of KSC 500 was less than the seronitals. RGR in the seronitals was for Ksc 704, and Ksc 700 and Ksc 500 were the next. The results showed that coming to the lowest rate of RGR in KSC 704 and KSC 700 was later. This reality shows lasting of grain increase and getting late at the lowest point RGR of N_1 230kg per ha and 5 lit amino acid in all three sorts shows this reality. Changes of TDW on the studied species show that during analyzing, growth rate was increasing in start. The most amount of TDW on shrub was for KSC 704 and KSC 700 and KSC 500 were the next. All three sorts on 230kg N_1 and 5 lit of amino acid had the most TDW. Compared with the others. The change process of this experiment showed that the most NAR was for KSC 704 and KSC 700 and KSC 500 were the next. All the three sorts come to the lowest point as coming the time of physiological assimilation rate.

Keywords- growth indexes, maize Hybrids, nitrogen, amino acid

Introduction

Dung, manure and chemical fertilizers are correlative that both kinds are needed to have desirability for plant growing. Long range ant too much application of chemical fertilizers has ill effects. One of the worst of them is productivity decrement due to lack of humus. Many experiments in this field show that dung and manure don't have ill effects. They also increase humus and protect it in soil. In other word, they could indirectly produce humus [10].

All plants-if their molecules are small-can assimilate nitrogen in original from like amino acid (esp, glutamic and spartic acid), sporogonium, glutamine, urea, uretic acid and soon. Nevertheless, the output of nitrogen assimilating is less than nitric or ammoniac nourishing in plants [4].

In sustained agriculture systems. use of biological fertilizer is very important for high productivity and rich, well-drained soil [31]. The term "biological fertilizers" is not only called to dung's, manure and so on, but also small living bacterial and fungal creatures esp, those which help plant growth (PGPR) and what they produce such as amino acids are of the most important fertilizers [25].

These kinds of amino acids and bacteria can cause mineral increasing in soil and control and omit the causes of herbal disease. Moreover, they influence on plants act by producing auxin [34]. These matters-regarding their effect on growth-are called stimulus to act [35].

Production and accumulation of TDW might be studied by two main analyzable and physiological indexes-CGR and RGR [3]. CGR, in fact, determines the extension of plant tissue and the crops sustainability determines the amount of TDW. CGR is also increasing of net weight of plants per time and period modules, viz, it shows plant photosynthesis, CGR is the causual for accumulating of TDW per period and primary dry weight of plant modules in two consecutive sampling and it usually trends downwards planting period [7,18,23,24]. Analyzing growth indexes and using some mathematical equations, their use has been studied by many scholars and they can determine growth stages (Phillips….) the main purpose of accounting growth equations is usually to explain how plants react to the environmental conditions [16,28,29]. Plants growth in farm conditions is often determined on the basis of analytical approach of TDW accumulation. Growth analysis may be identified on the basis of bush or a shrubbery area [8]. But considering that crops act is appraised on area module, it is preferred to the basis of bush approach [3,29]. Assessing the LA and plants dry weight are the only needs for analyzing growth indexes [20]. Net photosynthesis rate is assessed by dry plant production that is studied in the title quantitative analysis of growth [3].

LA size is one of the most significant parameters used for studying growth, assimilating and many ecological and agricultural process like photosynthesis, perspiration and environmental energy rate [26]. As Hodges Anstey and Kanemausu [22] reported, photosyn-

thesis, perspiration and TDW could be a subject of LAI. This index shows green leaf size per square mater and the farmland area. Since light energy converts to chemical by green leat, LAI could be a great factor in TDW and grain act, there upon [7]. LA is an index for leat existence of a plant or the farm area on which vegetation is located. In fact it shows the average number of leat total area in crop [6].

The purpose of this study was to assess the effect of nitrogen and amino acid on plant via measuring growth indexes.

Materials and Methods

To study the effect of nitrogen and amino acid, an experiment was done in karaj institute in 2008-2009 and 2010. It was factorial and done randomly in three repetitions. The distance of sorts was 1/5m and the repetitive distance was 4m. Each plot with 4 line and the lines distance 75cm and the length of 14 m soil sampling was performed in ten parts in 0-30 cm of the area. The samples were mixed and some was sent to the laboratory of Tehran water and soil researching institute federated to the organization of natural resources and agricultural studies to be experimented [Table-1].

Table 1- Soil Experiment Result

Year of Testing	Depth	[Total N] %	[P (AV.)] p.p.m.	[K(AV.)] p.p.m.	% (Clay)	% (Silt)	% (Sand)
2008		0.07	11.8	312	28.4	38.4	33.2
2009	0-30	0.1	4	169.2	29.4	37.4	33.2
2010		0.09	5.3	167.4	28.9	37.8	33.1

According to [Table-2] within three years of experiments, Nitrogen, phosphate and phosphate were used from urea, triple super sulfate and potassium sulphate sources respectively.

Table 2- The amount of fertilizer recommendations based on soil analysis by water and soil Institute

Year	Nitrogen	Kg/ha Phosphorus	Potassium
2008	230	92	0
2009	230	92	100
2010	230	92	100

The sorts of maize species included: A: rapidly-growing KSc500 hybrid, seronitals KSC700 and KSc704 hybrids. All of them were produced and surpassed in maize researches sector.

Nitrogen fertilizer: 3 amount of 0,115 and 230 kg pre ha each year in 4 times : 1/4 with phosphor and potash mixed to soil before planting, 1/4 when growing (6-8 leaf), 1/4when blooming and the last 1/4 between sap and pasty stages.

Amino acid in 3 amount of 0, 4 and 5 lit per ha sprinkled on the leaves in four times: the first, two weeks after planting (2-3 leaf), the second when growing (6-8 leaf), the third when blooming, and the fourth between sap and pasty stages. The field was plowed and Eradican herbicide (Eradicican (EPTC, S-ethyl dipropyl carbamothioate plos R- 25788)) 1/8 kg per ha was equally given to the soil before planting and after planting, it was weeded two times. Irrigation was directed from the original canal to each part on mound.

To study and analyze growth process, as piling the canopy, three shrub was reaped and the sampling was repeated every 10 days, and then they were sent to the laboratory to determine LA using LAM, LAI is evaluated by proportion of LA to the planted area no module exists for LA and this formula could be used to evaluate

LAI: LAI = LA_1+LA_2 / $_2 I$ / GA

LA_1 and LA_2 are the La_s of successive harvests and GA is the planted area. All parts of the shrub is dried for 48h in a 75°C oven to assimilate the dry weight and growing indexes such as LAI, CGR, RGR, and NAR are assimilated by the formulas.

The average CGR: maximum increase of dry weight of a plant a day is called CGR and its module is gram per aquare meter a day ($g.m^{-2}$ - day^{-1}) [3]

$CGR = (w_2 - w_1) / (T_2 - T_1) \times 1 / GA$

w_1 and w_2 : TDW in two successive harvests.

T_1 and T_2 : the period between two successive harvests. GA is the planted area.

The average of RGR : it is assimilated on size growing rate per time of RGR : it is assimilated on size growing rate per time module - As a whole on the basis of ($g.g^{-1}.day^{-1}$) [3,6].

RGR = CGR / TDW

The average of TDW : $TDW = (w_2-w_1) / 2$

The average of NAR : the leaf module rate is the matter mostly photosynthetic produced on loaf area module per time ($g.m^{-2}$ - day^{-1}) [3].

NAR = CGR / LAI

Mean comparison and variance analysis was performed by a copy of 9/1 SAS software.

Conclusion and Discussion

Leaf Area Index (LAI)- In this experiment, the change process of leaf area showed that the most LAI in the two seronital species of all sorts was for KSC704 and KSC700 was the next. LAI of KSC500 was less than the seronitals. [Fig-1], [Fig-2] and [Fig-3]. LAI explains yhat plants photosynthesis may produce crop potentially. This conclusion shows that the most LAI in all three species was influenced by adding fertilizer in 230kg nitrogen and 5 lit of amino acid per ha. By the way, the use of amino acid had more LAI compared to not to use fertilizer [Fig-1], [Fig-2] and [Fig-3].

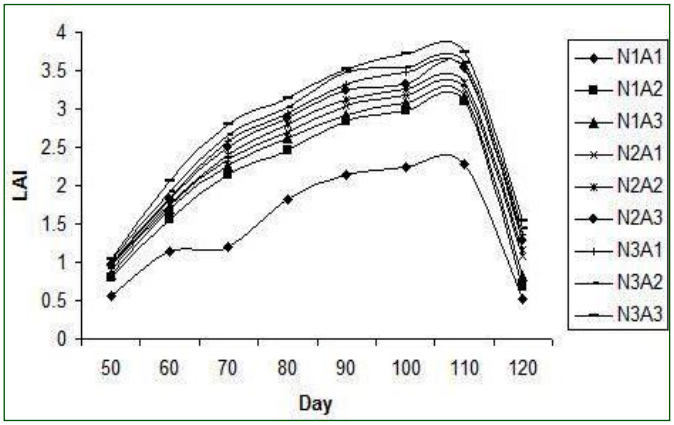

Fig. 1- The process of LAI on KSC500 hybrid for different amount of N_1 and amino acid (not to use nitrogen = N_1, use of 115 kg N_1 per ha = N_2, use of 230 kg N_1 per ha = N_3, not to use amino acid = A_1, use of 4 lit amino acid per ha = A_2 and use of 5 lit amino acid per ha = A_3)

Anderson, [14] and west, [36] reported that there's a high correlation between establishment of leaf (saturated with light) and nitrogen density in every LA. According to Wolton [35] lack of nitrogen

by decreasing LAI and synthesis and protein collision cause leaves to be viz end and has ill effects on the process of photosynthesis. Rajput [30] reported that use of nitrogen in fluencies on growth, LA productivity and the capability of photosynthesis - so photosynthesis of LA decreases as nitrogen decreases.

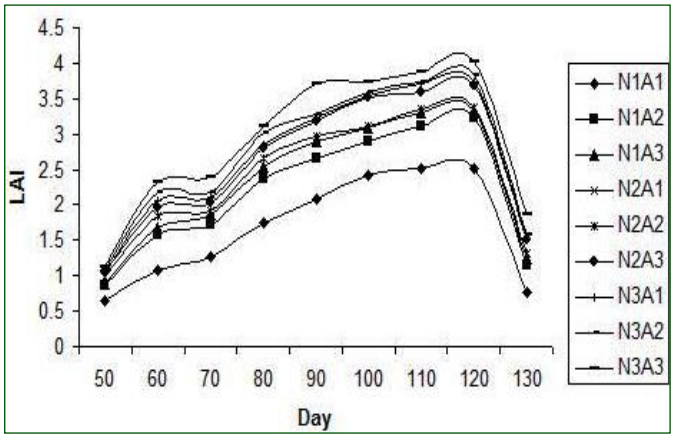

Fig. 2- The process of LAI on KSC700 hybrid for different amount of N_1 and amino acid (not to use nitrogen = N_1, use of 115 kg N_1 per ha = N_2, use of 230 kg N_1 per ha = N_3, not to use amino acid = A_1, use of 4 lit amino acid per ha = A_2 and use of 5 lit amino acid per ha = A_3)

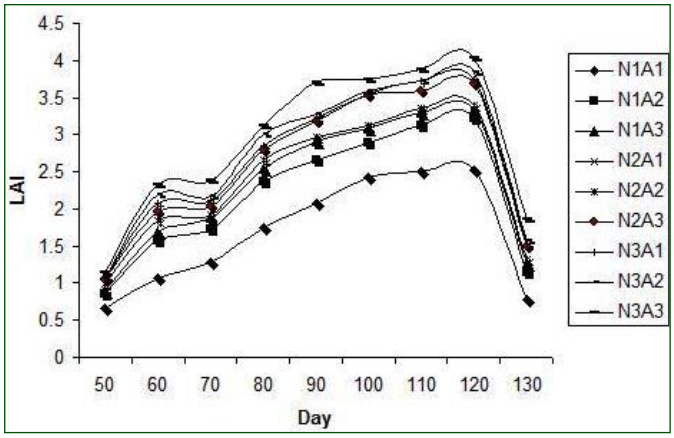

Fig. 3- The process of LAI on KSC704 hybrid for different amount of N_1 and amino acid (not to use nitrogen = N_1, use of 115 kg N_1 per ha = N_2, use of 230 kg N_1 per ha = N_3, not to use amino acid = A_1, use of 4 lit amino acid per ha = A_2 and use of 5 lit amino acid per ha = A_3)

Crop Growth Rate (CGR)

CGR shows crops photosynthesis efficiency an it is stated as TDW in time and farmland module [12]. In this study, CGR is assimilated on TDW amount (gram) for farmland (aquare metar) and each day.

In this experiment, studying CGR process, we see that in the three species, the changes are like change process of LA. The most crop growth in two seronitals is for KSC704 and KSC700 is the next. Growth rate of KSC500 is less than the seronitals [Fig-4], [Fig-5] and [Fig-6]. It seems that nitrogen and amino acid could increase LAI and CGR in accompany, regarding the sub confrarity of LA and CGR. So that use of 230 kg nitrogen with 5 lit amino acid per ha cansed LAI and CGR increment in comparison to the other sorts [Fig-4], [Fig-5] and [Fig-6].

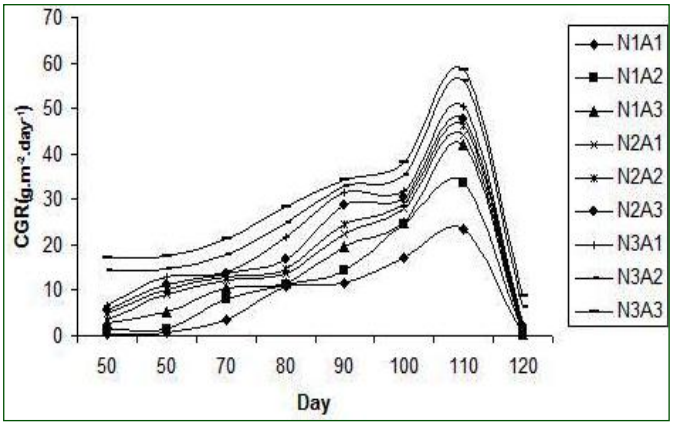

Fig. 4- The process of LAI on KSC500 hybrid for different amount of N_1 and amino acid (not to use nitrogen = N_1, use of 115 kg N_1 per ha = N_2, use of 230 kg N_1 per ha = N_3, not to use amino acid = A_1, use of 4 lit amino acid per ha = A_2 and use of 5 lit amino acid per ha = A_3)

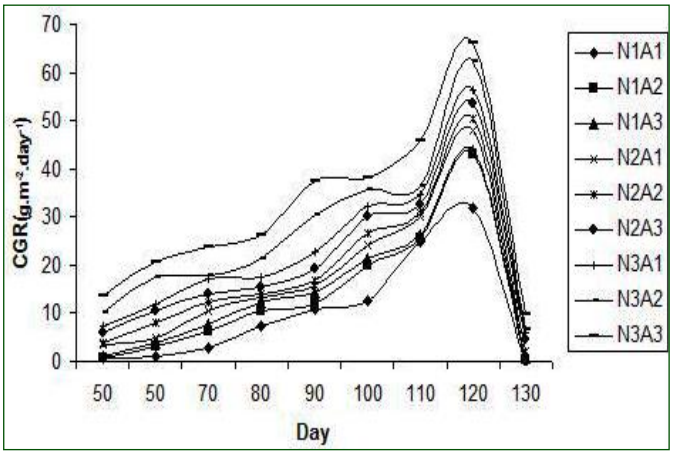

Fig. 5- The process of LAI on KSC700 hybrid for different amount of N_1 and amino acid (not to use nitrogen = N_1, use of 115 kg N_1 per ha = N_2, use of 230 kg N_1 per ha = N_3, not to use amino acid = A_1, use of 4 lit amino acid per ha = A_2 and use of 5 lit amino acid per ha = A_3)

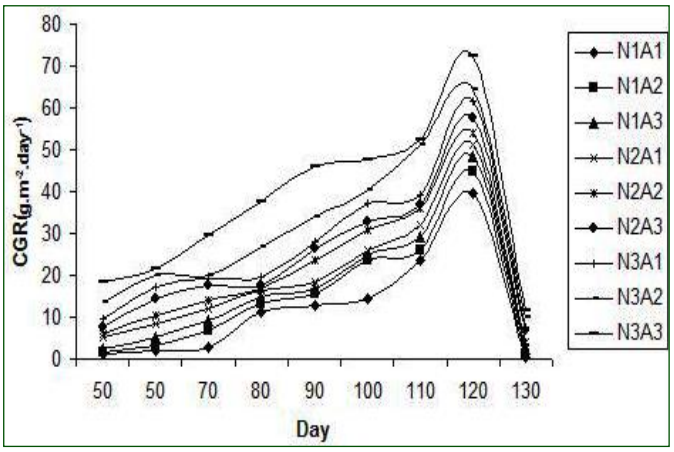

Fig. 6- The process of LAI on KSC704 hybrid for different amount of N_1 and amino acid (not to use nitrogen = N_1, use of 115 kg N_1 per ha = N_2, use of 230 kg N_1 per ha = N_3, not to use amino acid = A_1, use of 4 lit amino acid per ha = A_2 and use of 5 lit amino acid per ha = A_3)

Relative Growth Rate (RGR): RGR is TDW in time and plant dry weight modules In the study, velative growth is stated as ($g.g^{-1}.day^{-1}$) [6]. Relative growth has decreased proported to the lower leaves as time passes [5,19,27,33].

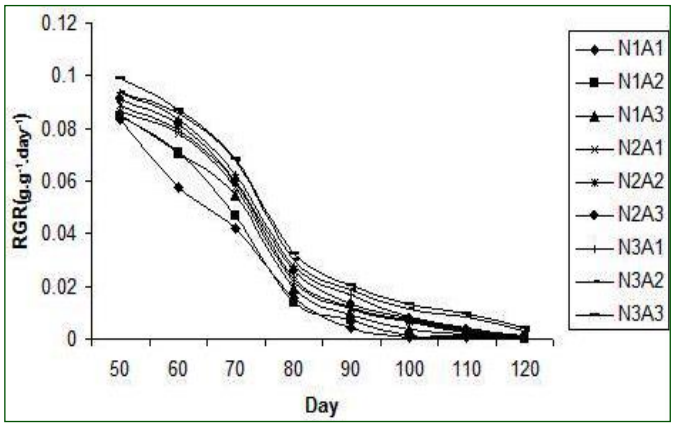

Fig. 7- The process of LAI on KSC500 hybrid for different amount of N_1 and amino acid (not to use nitrogen=N_1, use of 115 kg N_1 per ha=N_2, use of 230 kg N_1 per ha=N_3, not to use amino acid=A_1, use of 4 lit amino acid per ha=A_2 and use of 5 lit amino acid per ha = A_3)

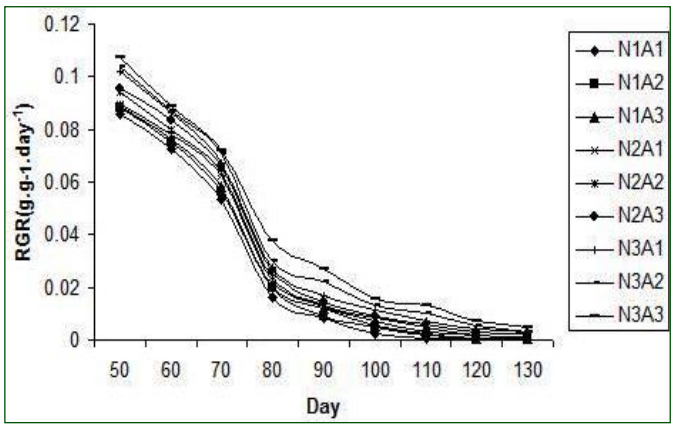

Fig. 8- The process of LAI on KSC700 hybrid for different amount of N_1 and amino acid (not to use nitrogen = N_1, use of 115 kg N_1, per ha = N_2, use of 230 kg N_1 per ha = N_3, not to use amino acid = A_1, use of 4 lit amino acid per ha = A_2 and use of 5 lit amino acid per ha = A_3)

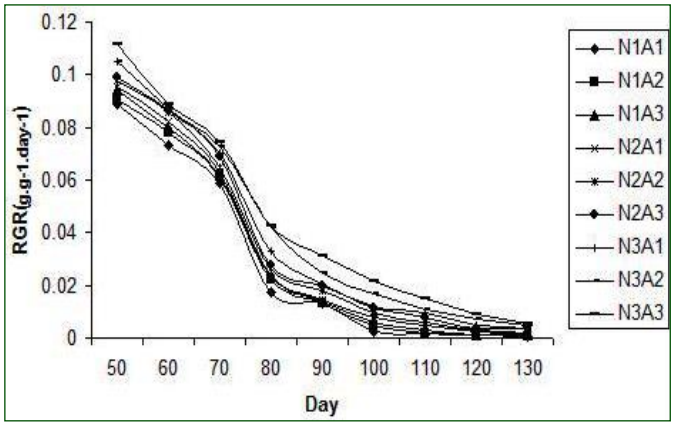

Fig. 9- The process of LAI on KSC500 hybrid for different amount of N_1 and amino acid (not to use nitrogen=N_1, use of 115 kg N_1 per ha = N_2, use of 230 kg N_1 per ha=N_3, not to use amino acid=A_1, use of 4 lit amino acid per ha = A_2 and use of 5 lit amino acid per ha = A_3)

In the experiment the process of the change of relative growth showed that the most RGR in seronitals was for KSC704 and KSC700 and KSC500 were the next and as they grow physiologically, RGR comes to the lowest point that states producing of most TDW which is obtained during physiologic growth and the results show that KSC704 and KSC700 hybrids came late to the lowest point of RGR and this reality shows lasting of grain density and late coming of RGR s lowest point in 230 kg nitrogen and 5 lit amino acid per ha for all the species to the instance [Fig-7], [Fig-8] and [Fig-9].

The Average of Total Dry Weight (TDW)

Studying the changes of day matter in the mentioned species shows that the most matter accumulated on shrub was for KSC704 and KSC700 and KSC 500 were the next then, as the leaves get pale at the and of growing season it causes DW increment in upper parts of plant. Paling and increasing differ to increasing of fertilizers. So in all sorts for 230 kg nitrogen and 5 lit amino acid per ha had the most accumulated dry matter [Fig-10], [Fig-11] and [Fig-12].

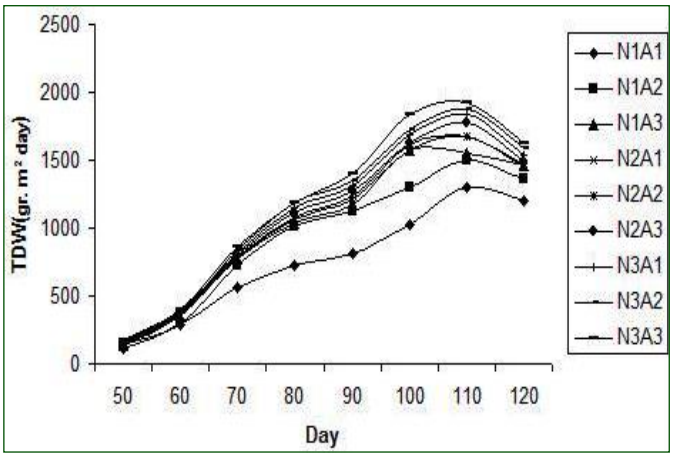

Fig. 10- The process of LAI on KSC500 hybrid for different amount of N_1 and amino acid (not to use nitrogen = N_1, use of 115 kg N_1 per ha = N_2, use of 230 kg N_1 per ha = N_3, not to use amino acid = A_1, use of 4 lit amino acid per ha = A_2 and use of 5 lit amino acid per ha = A_3)

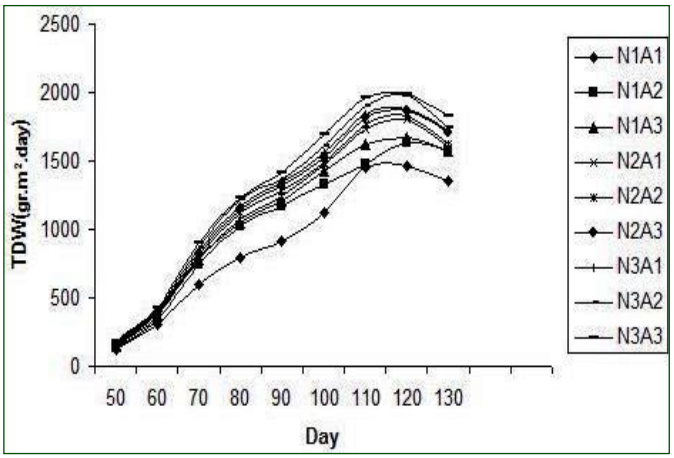

Fig. 11- The process of LAI on KSC700 hybrid for different amount of N_1 and amino acid (not to use nitrogen = N_1, use of 115 kg N_1 per ha = N_2, use of 230 kg N_1 per ha = N_3, not to use amino acid = A_1, use of 4 lit amino acid per ha = A_2 and use of 5 lit amino acid per ha = A_3)

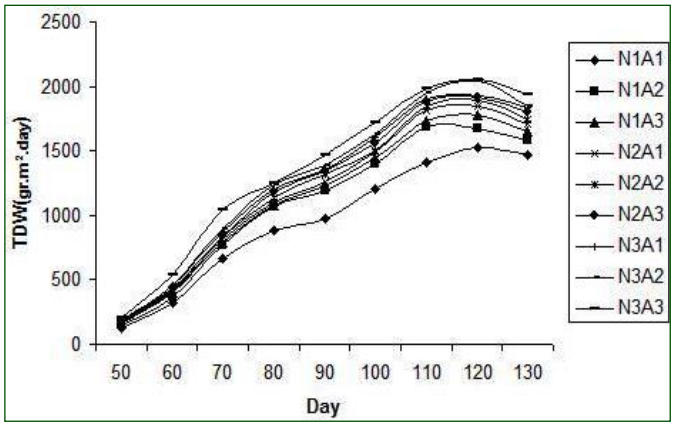

Fig. 12- The process of LAI on KSC704 hybrid for different amount of N_1 and amino acid (not to use nitrogen = N_1, use of 115 kg N_1 per ha = N_2, use of 230 kg N_1 per ha = N_3, not to use amino acid = A_1, use of 4 lit amino acid per ha = A_1 and use of 5 lit amino acid per ha = A_3)

Net Assimilation Rate = NAR

Net assimilation rate is the produced dry matter for time module which is an index for leaf for time module which is an index for leaf photosynthesis act and plant production on a shrub or a planted shrubbery. In this studied experiment the most NAR was for KSC704 and KSC700 and KSC500 were the next. NAR of all species come to the lowest point as they get nearer to physiologic growth [Fig-13], [Fig-14] and [Fig-15]. Change process of NAR is proported to pass of time and it trends downward after reaching to the highest rate of NAR.

The lowest point of NAR shows not to increase dry matter for LA in time passing and the lower amounts is because of leaf shading and decreasing of their photosynthesis.

According to the results. In KSC704, KSC700 and KSC500. Use of 230 kg nitrogen and 5 lit amino acid cause the most NAR compared to not using of fertilizer.

And increasing of photosynthesis due to use of nitrogen and biological fertilizers including amino acid and so increasing of dry matter and productivity is expected.

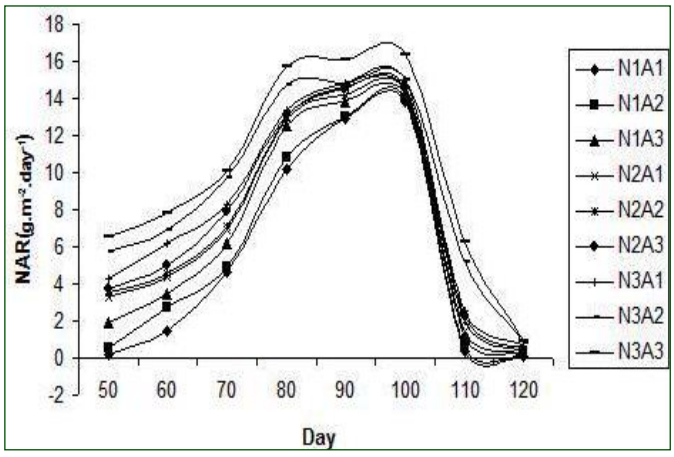

Fig. 13- The process of LAI on KSC500 hybrid for different amount of N_1 and amino acid (not to use nitrogen = N_1, use of 115 kg N_1 per ha = N_2, use of 230 kg N_1 per ha = N_3, not to use amino acid = A_1, use of 4 lit amino acid per ha = A_2 and use of 5 lit amino acid per ha = A_3)

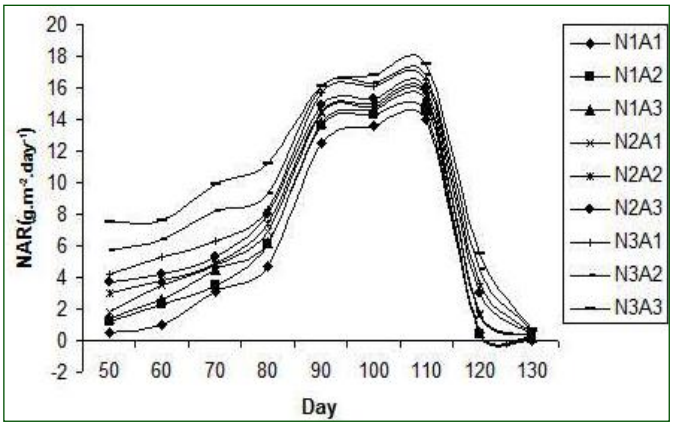

Fig. 14- The process of LAI on KSC700 hybrid for different amount of N_1 and amino acid (not to use nitrogen = N_1, use of 115 kg N_1 per ha = N_2, use of 230 kg N_1 per ha = N_3, not to use amino acid = A_1, use of 4 lit amino acid per ha = A_2 and use of 5 lit amino acid per ha = A_3)

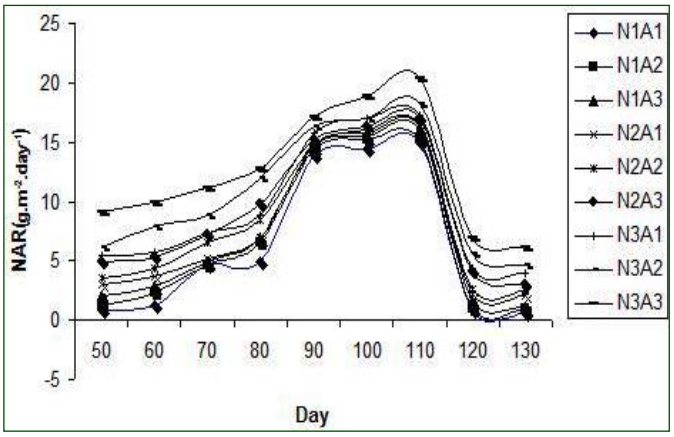

Fig. 15- The process of LAI on KSC700 hybrid for different amount of N_1 and amino acid (not to use nitrogen=N_1, use of 115 kg N_1 per ha = N_2, use of 230 kg N_1 per ha=N_3, not to use amino acid=A_1, use of 4 lit amino acid per ha=A_2 and use of 5 lit amino acid per ha = A_3)

Conclusion

According the results of this research, nitrogen fertilizer and amino acid have eye catching effects on dry matter accumulation in vegetative, natal and growth indexes of studied hybrids and the species differed in reaction to use of nitrogen and amino acid. So as an growth analysis conclusion we can say that the most accumulated dry matter, LAI, CGR, RGR, and NAR was for KSC704. On the basis of this research we find that the used nitrogen and amino acid through different interactions esp, producing growth regulators caused increasing of dry matter accumulation and growth indexes and there for caused total growth increment.

The results showed that nitrogen fertilizer & amino acid have eye - catching effects on dry matter accumulation in vegetative, natal & growth indexes of studied hybrids & the species differed in reaction to use of nitrogen & amino acid. So as an growth analyzing conclusion we can say that the most accumulated dry matte, LAI, CGR, RGR and NAR was for KSC704. On the basis of thy research we find that the used nitrogen & amino acid through different interactions esp, producing growth regulators caused increasing of dry matter accumulation & growth indexes and there for caused total growth increment.

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