Effect of mixing some varieties of egyptian clover and promising s.trains of ryegrass onthe forage yield and ”quality

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Two field experiments were conducting during winter ’ growing seasons of 2001/2002 and 2002/2003 at Moshtohor Research center of the Faculty of Agriculture, Zagazig University (Benha Branch). The aim of this investigation was to study the effect of mixing some varieties of berseem clover and promising varieties of ryegrass on the forage yield and quality.Factors under study :The experiment included 15 treatments which were :A. Three varieties of berseem clover (Trifolium alexandrinum) in pure stands:1-Serw 1 (Se).2-Tarkeby seds (Te).3-Sakha 96 (Sa).B. Three promising varieties of the annual ryegrass (Lolium multiflorum) in pure stands :4-MT 1454 promenade (Pro).5-MT 660 Tewara sama (Te).6-MT 1465 Primora (Pri).C. Nine binary combinations of each of above three berseem clover and three ryegrass varieties using 50% of the recommended seeding rate of each of the two botanical components for the proposed forage mixtures were as follows:7-Serw 1 x promenade (Se x Pro) M18-Serw 1 x Tewara sama (Se x Te) M29-Serw 1 x Primora (Se x Pri) M310-Tarkeby seds x Promenade (Ta x pro) M411-Tarkeby seds x Tewara sama (Ta x Te) M512-Tarkeby seds x Primora (Ta x Pri) M613-Sakha 96 x Promenade (Sa x Pro) M714-Sakha 96 x Tewara sama (Sa x Te) M815-Sakha 96 x Primora (Sa x Pri) M9Results of each of the two seasons and their combined could be summarized as follows:- Forage yield: -Fresh forage yield:1-Over the varieties of ryegrasses or clovers, total fresh forage yield of ryegrass was significantly higher than for clover in their pure stands.2-Total fresh forage yield of primora (Pri) ryegrass was slightly the highest among the other two varieties of Promenade (Pro) or Tewara Sama (Te). This result was true in the two seasons and their combined analysis with slight fluctuated significant differences .3-In pure stands, berseem clover cv Serwl (se) was the highest in fresh forage production than the other two varietiesTarkeby seds (Ta) and sakha 96 (Sa). Such result was true for the two seasons and their combined analysis with slight various significant differences between the other two.4-Berseem clover cv Sa produced slightly higher fresh forage yield than Ta cv. with significant difference in the second season only. whereas, such differences in the first season and the combined analysis for the later two berseem clover cultivars were not significant.5-Pure stands of berseem clover varieties and ryegrass varieties behaved unlikely concerning fresh forage yield of the subsequent cuts. Total forage yield of ryegrass increased substantially for the subsequent cuts, where the highest fresh forage yield was produced from the fourth or the latest cuts.6-The progressive substantial increase in fresh forage production of the pure stands of grasses for the latest cuts were much more in yield than the first cuts.7-Among the grown forage mixtures of legumes and grasses, the total fresh forage yield for each of the three berseem clover varieties (Se, Ta and Sa) with any of the associated three ryegrass varieties (Pro, Te and Pri) showed no significant differences. This indicates no preference for any of the there grown berseem clover varieties (for the proposed forage mixtures) with any of ryegrass variety as for as fresh forage yield is concerned.8-The effect for each berseem clover variety (over the 3 ryegrass) in mixtures was slightly more for Sa, than Ta followed by Se clover in fresh forage productivity.9- Any of the proposed forage mixtures produced significantly higher fresh forage yield than its relevant components in their•pure stands in the two seasons and their combined analysis.10- The proposed

nine forage mixtures did not exert appreciable differences in their fresh forage yield productivity. Meanwhile, there was a number of significant differences in fresh forage yield productivity among the various mixtures with relatively small variable magnitudes of no specific trend. These results were noticed in the two seasons and the combined analysis as well.I I - Previously mentioned results were also noticed for the subsequent individual cuts of each season with more or less of acceptable fluctuated differences.•-Dry forage yield12-Over the grown varieties in pure stands, total dry forage yield of ryegrasses was significantly higher than for clovers.13-The obtained differences in dry yield of ryegrasses than clovers were higher in all of the individual cuts except for the second cut of the first season. However, such differences were slightly fluctuated in magnitudes.14-Among berseem clover varieties or the ryegrass varieties in their pure stands, the differences in total dry yield were not that great. However, berseem clover Tarkeby seds (Ta) produced the lowest total dry yield than Serwl (Se) and Sakha 96 (Sa) where the difference between the later two varieties was very slight and could be ignoraed.I5- Ryegrass varieties in their pure stands showed thatpromende variety (Pro) produced the lowest total dry yield compared with Twarsama (Te) or Primora (Pri).whereas, difference in total dry yield between the later two varieties of ryegrass was very slight and insignificant that could be ignored.16-Total dry forage yield production of berseem clover varieties Se or Sa was better than Ta in their pure stands.17-Also, dry forage yield of Te or Pri ryegrass varieties was higher than Pro variety in their pure stands.18-Dry forage yield of the individual cuts of each of the two seasons and their combined analysis was more likely behaved in a similar mannar as previously presented.19-Any of the proposed forage mixtures produced significantly higher dry yield as compared with any of their relevant components in their pure stands. These results were true for the two season and their combined analysis. This trend was noticed on the basis of the individual cuts and over the 3 pure stands of ryegrass and/or clover varieties20-The behavior of the obtained dry forage yield of the proposed mixture and their pure stands was almost similar to fresh yield with some slight variations of different magnitudes.21-No appreciable differences in dry forage yield was obtained between each of the proposed nine forage mixtures. This was true on the basis of the individual cuts and/or total dry yield of the two seasons.11. Growth characteristics: - Plants Heights :Height of plants in their pure stand were varied according their nature (legumes / grasses), varieties and or varieties , seasons and the subsequent duration of cuts.22-Clover variety Sakha (Sa) was of the tallest plants compared to serw 1 (Se) and Tarkeby Seds (Te) varieties where height of plant did not significantly varied among the later two varieties.23-In pure stands, ryegrass Promenade variety (Pro) was significantly taller than Tewara sama (Te) and Primra (Pri) varieties . However, no significant difference was noticed in heights of the later two varieties .24-Also in pure stands, over the grown varieties of berseem clover, ryegrasses plants were much taller than clovers in the first season of the 3rd cut and in the second season of the 4th cut. whereas, in the other cuts of the two seasons, such differences in plant heights of ryegrasses or clovers were not always constant and more likely fluctuated with no specific trend.25-Height of plants in the proposed mixtures varied than what was noticed in their relevant pure stands. On the average of the four cuts, it was noticed that height of clover plants were slightly shorter in mixtures than in their pure stands. Meanwhile, an opposite situation was noticed with ryegrasses in their mixtures with berseem clover. It looks to be true that grasses tried to compete with legumes for light and theessential requirements for growth and elongation, which finally produced taller ryegrass plants in the grown mixture than in their pure stands.26-Ryegrasses plants were taller in their mixtures with clovers than in their pure stands. Such differences in height of plants in mixtures and in their pure stands varied with different magnides where the smallest differences were noticed in the early cuts and the latest cuts.27-That height of clover plants slightly decreased in mixtures with ryegrasses as compared with their plants in pure stands. This is opposite to what was noticed for ryegrasses which were taller in their mixtures compared to its pure stands.28-Mixing each of the 3 clover varieties with any of the 3 varieties of ryegrass did not show appreciable differences in heights of each of the associated plants in proposed the mixtures.- Number of plants (columns and/or branches) /0.25 sq meter:29-Number of ryegrass plants over the subsequent cuts was significantly higher in each of the proposed mixtures as compared with each variety of ryegrasses in their pure stand. So number of ryegrass plants increased on the expens of

the number of plants per 0.25 sq meter.- Leaf /stem ratio:30-In pure stands leaf/stem ratio for ryegrass varieties were more than double as that for berseem clover varieties.31-leaf/stem ratio of ryegrasses were slightly and continuously decreased for the subsequent cuts as the cuts proceeded. However, such trend was not much clear with clover.32-In pure stands, within ryegrass varieties , Pro was of the highest leaf/stein ratio (2.05) followed by Pri (1.96), then Te ryegrass variety (1.79) with significant differences in between in the first season. In the same season the 3 berseem clover varieties did not show significant differences in leaf/stem ratio. whereas in the second season such trend was not noticed.33-Differences in leaf/stem ratio for the individual cuts between ryegrass varieties or within berseem clover varieties in their pure stands were fluctuated within a very narrow ranges which could be ignored insipte of the obtained slightly significant differences in few cases.34-Either in pure stands or in the associated of mixtures, ryegrass varieties remained to have more leaf/ stem rations as compared with clover varieties. This results was true in most of the cuts of the two seasons and their combinedanalysis.35-Leaf/stem ratio was continuously decreased for the subsequent cuts as the cuts proceeded for both of clover varieties and ryegrass varieties in almost each of the proposed mixtures. So, first cuts have the highest leaf/stem ratio. whereas, the latest cut have the lowest ratio for the, associated clover and ryegrass mixtures.36-Significant variations in leaf / stern ratios were noticed within each of the two associated components of each mixture in each of the obtained cuts of the two seasons and their combined analysis. However, each of the proposed mixture has its owen, identity as far as this studied trait is concerned.37-Above the average of the whole cuts, the highest significant leaf/stem ratio was obtained in Mixture M3 (clover cv Serw 1 x ryegrass variety Primora).38-Leaf/stem ratios were much higher for ryegrass varieties than that of clover varieties in their pure stands or in their mixtures. This result was noticed in the two seasons.39-No appreciable differences between varieties of ryegrass or clover varieties in their pure stands could be firmly detected under the circumstances of this study.- Leaf area index (LAI):40-Over the varieties of clover or ryegrass in their pure stands, LAI of ryegrasses was almost double as that of clovers.4 1 - There was no significant difference in LAI between each of the three varieties of berseem clover or within the three varieties of ryegrass in their pure stands over the four cuts. This result was noticed in each of the two seasons and their combined analysis.42- Regarding the individual cuts, results showed that the highest values of LAI were noticed in the second cuts as.compared with the earlier or the later cuts for either ryegrass or clover varieties.43-Differences in LAI values between the 3 varieties of ryegrass or the 3 clover varieties were not significant in mostof the obtained cuts of the two seasons and their combined analysis. Such LAI values were fluctuated within a verynarrow range giving no clear cut performance for any varietyof ryegrass or clover in respect of this studied trait in their pure stands.44-Any of the tested varieties of ryegrass or clover are of almost similar LAI value, and they are of best fit to be usedin any of the proposed mixture without any detected clear differences.45-Significant higher LAI for each variety of ryegrass in theproposed mixtures (Ml — M9) as compared with its relevant in pure stands.46-Any of the proposed mixtures of ryegrass varieties andclover varieties produced relatively higher LAI than in their pure stands.47-Regarding the botanical composition, ryegrasses percentagein the mixture substantially increased and that of clover decreased as the cutting sequence proceeded.- Crude protein (CP) content:48-No appreciable differences in CP content within each of the three berseem clover varieties or between any of the three ryegrass varieties in their pure stands were detected. This -ANtrend was noticed either in the earlier or later cuts in the two seasons. In other words, CP contents were more or less similar for the three berseem clover varieties and within the three ryegrass varieties as well.49-Any of the grown berseem clover varieties contained relatively higher CP content than any of the grown ryegrass varieties in their pure stands. These results were clear for the earlier and the later cuts of the two seasons.50-It is well noticed that CP content decreased clearly as the stage of growth proceeded from the second to the fourth cut. These results were obtained for either berseem clover or ryegrass varieties in their pure stands during the two seasons.51-For all of the proposed binary forage mixtures (M1 — M9) of berseem clover and ryegrass varieties , CP content were almost on the average between what was obtained for berseem clovers and ryegrasses, in their pure stands.52-The associated mixtures (M1 — Ma9) contained almost similar CP contents. This results was true for the second (earlier cut) and

the fourth cut (later one). However, earlier cuts contained relatively higher CP content as compared with the later cuts for any of the proposed forage mixtures.53-The CP content was fluctuated within a very acceptable narrow ignorable differences within the proposed mixtures. Meanwhile, more CP content was detected for their earlier than their later cuts- Crude fiber (CF) content:54- Crude fiber percentage was relatively higher in each of theryegrass varieties than in each of berseem clover varieties in their pure stands.'55- No appreciable differences in CF percentages among the three berseem clover or the three ryegrass varieties in theirpure stands neither in the second cuts (early cuts) nor in the fourth cuts (late cuts).56-The CP percentage is not a variable to be distinguished between specific varieties of berseem clover and/or ryegrass.57-The proposed binary mixtures of berseem clover varieties and ryegrass varieties (M1 — M9) did not show appreciablenoticeable differences among each other in its CP content. This was clear in the early or the late cuts during the two seasons where the recorded CF percentage ranged within a very narrow ranges which could be ignored. So, CF percentages of the grown mixture could be considered similaramong mixtures of different varieties of clover and ryegrass during the two seasons.58-The CF content of the proposed binary forage mixtures was relatively higher for the later cuts (4th cut) as compared withthe earlier cuts (2nd cut). This result was true for each of the two seasons.59-All of the obtained forage mixture were not varied appreciably in their CF content within the same cut. But, CF content was clearly higher for the later than the earlier cuts in the two seasons. The ranges in CF percentage of the proposednine forage mixtures were almost similar within each particular cuts, with a noticeable higher magnitudes for the 4th cuts as compared with the 2" cuts in the two seasons.60-The obtained CF values were half-way in between as compared with their relevant components of clover and ryegrass varieties in their pure stands. In other words, the higher CF content of ryegrasses imposed its impact on the lower CF of the associated clovers which came up with a moderate CF content of the relevant forage mixtures.- Ash content:61-Ash content was (on the average) slightly higher for berseem clover than ryegrass varieties in their pure stands with no differences among clover or ryegrass varieties during the two seasons for each of the assigned individual cuts.62-Slight reduction in ash percentage was obtained for the 4th cuts as compared with the second cuts of the two seasons over the three clover varieties. Similar trend was noticed over the three ryegrass varieties in the second season and on the means of the two seasons.63-The nine grown forage mixtures (m I — m9) were almost similar in ash percentage with slightly lower magnitudes in the later cuts (4th cuts) than the earlier ones (2" cuts). This result was noticed in the two seasons .'- Ether extract (EE) percentage:64-The EE percentages were slightly higher with noticeable magnitudes for ryegrass than berseem clover varieties. This result was obviously clear on the individual basis of pure stands and over the varieties of berseem clover and ryegrass.65-Percentages of EE contents were slightly higher in the 2nd (earlier) cuts as compared with the 4th (later) cuts with slightly larger magnitudes for grasses than legumes in their pure stands over the of ryegrass and varieties or clover in their pure stands. This was noticed in each of the two studied seasons.66-The EE percentages of the studied forage mixtures were of narrow and limited magnitudes.67-The EE percentage range of the obtained forage mixture were not varied much to be recognized. However, the proposed mixtures were generally lower in EE content than grasses and higher than legumes in their relevant pure stands with slight differences.68-Also, in mixtures, the late cuts (4th cut) were slightly lower in EE percentages than the earlier ones (2nd cut) with more clear differences of relatively larger magnitudes on pure stands basis.- Nitrogen free extract (NFE) content :69-The NFE of ryegrass varieties were relatively higher than clover varieties in their pure stands.70-No noticed differences could be specifically recognized forthe NFE contents within the grown ryegrass varieties or within clover varieties in their pure stands. This is because of the very narrow ranges of NFE within each group of grasses• or legumes, in spite of the relatively higher values of NFE content of ryegrass than clover varieties.71-Relatively higher values of NFE percentage in ryegrass varieties and berseem clover varieties at the later (4th cut) than the earlier ones (2nd cuts) during the two seasons.72-The obtained forage mixtures were almost similar in their NFE where such values were much close to each other. In spite of the relative similarities in NFE values for each of the grown mixtures, such values were relatively higher than in their associated clover varieties in their pure stands.73-Higher NFE contents were also obtained in the 4th cuts than

2nd cuts in all mixtures as previously presented in their relevant pure stands with slightly lower magnitudes in most cases.- Digestible Protein (DP) content:74-In pure stands, any of the three berseem clover varieties contained relatively higher digestible protein content as compared with any of the three ryegrass varieties . Also, digestible protein was higher for the early (2nd cut) as compared with the late cuts (4th cut). Such trend was noticed during the two seasons..75- No detectable differences in DP content could be recognized within each the 3 berseem clover or within the each of the 3 ryegrass varieties. So, no preference with any ofthe 3 clover or ryegrass varieties in DP% could be suggested.76- Regarding DP content of the proposed 9 mixtures (M1-M9) of clover and ryegrass varieties , such nutritive parameter in their mixtures was slightly lower (or more or less similar) compared to their relevant clover varieties in their pure stands.' 77- Mixtures almost contain DP content similar to their clover varieties and higher than their ryegrasses in their pure stands. It could be concluded that DP content of ryegrasses increased by the presence of clover in the mixture, but DP of clover was not detectably reduced or affected in presence of ryegrasses. So, clovers imposed its influence in increasing DP content when mixed with ryegrasses of low DP%.78-The DP contents were noticed to be higher for early than late cuts for either ryegrasses or berseem clover varieties in their pure stands or in their mixtures.- Total Digestible Nutrients (TDN) content :79-Over each of the three ryegrass and / or the three varieties of berseem clover, TDN % was relatively higher for grasses than clovers. This trend was also noticed for each variety of ryegrass and each variety of clover.80-The TDN of the pure stands of either grasses or legumes were noticeably higher for the earlier cuts than the later cuts during each of the two seasons.81-The TDN% of the nine proposed forage mixtures (MI —M9) were almost similar, but having relatively lower valuesthan grasses and higher ones than legumes. Meanwhile, such values in forage mixtures behaved in a similar manner as previously presented among the earlier than the later cuts. In other words legumes and ryegrasses reflected its owen identity in TDN content on their mixtures.82-The estimated total digestible nutrients yield (TDNY) of the proposed binary forage mixtures and their relevant pure stands was almost similar and having similar trend as for the TDN content and dry forage yield previously presented.83-Chemical constituents and nutritive parameters of the tested forage mixture and their associations in pure stands (luring the earlier (2" cuts) and later cuts (4th cuts) are presented. This will summarize and facilitate any of the required further information for comparisons, trends, relations and limits for such studied parameters (CP, CF, Ash, EE, NFE, DP and TDN).