SUMMARY AND CONCLUSION

The main point of this study is the evaluation of organic compost as a source of nutrient demand by potatoes cultivated in light texture soil under drip irrigation system. The composted materials either applied alone or in combination with mineral fertilizer have an effective role on potato yields and nutrients management under field scale. So, many objectives were achieved. The valuable results obtained in the present study could be summarized as follows:

Part one : Composting Experiment

pH changes of composted materials : pH values tented to increase with time up to 60 days of incubation. This holds true with different composting treatments. In the same time, pH values were fluctuated according to composting treatments.

EC changes with time: EC values tended to increase up to 30 days and highest values was recorded with T_6 and the lowest one was recorded with T_4.

Nitrogen content in composted materials: Both the treatments and incubation period have significant effects on nitrogen content of the composted materials. Also, we can select T_6 as the best treatment, which enriched the composted materials.

Change of C/N ratio with time: The C/N ratio was decreased during the composting process. The initial ratio of C/N, which ranged between 22 and 72, substantially decreased in all windrows depending on its composition.

Organic matter content of the composted materials: The originated organic matter was more able to degrade with time

progress up to 60 days of incubation. In the same time, the addition of T_6 had encouraged this process of degradation (mineralization of organic N)

Phosphorus content in composted materials: It seems that phosphorus percent in organic wastes (compost) was frequently affected by addition treatments. The highest percent of P was induced by application treatments at 60-day interval while the lowest one was noticed after 30 days of incubation.

Potassium content of composted materials: We can conclude that the compost was richness in K^+ content at 60 days, which we believe it is the mature stage, when T_4 and T_6 were applied.

Micronutrients in composted materials: (Fe) In spite of treatments, the highest values of Fe in compost were detected at 60 days interval. The overall mean of treatments indicated the superiority of T_1 over the others followed by T_5.

(Cu), It is obvious that the Cu content of organic media was significantly increased with progress of incubation time intervals. At the same time, T6 treatment was superior over the other pretreatments as indicated from the overall average of composting treatments.

(Mn), Mn content was increased with time interval progress. The best value of Mn content was occurred at 15-day incubation time interval as compared to other intervals. It positively affected by composting treatments.

(Zn), The content of Zn was fluctuated along with time intervals depending on composting treatments.

Part two : Potato Field Experiment

Dry matter yield: Shoot, Shoot dry weight was frequently affected by compost treatments depending on potato variety. It was better under 100% OM than under 50%OM + 50%CF. The overall average of compost treatments reflected the superiority of T_3 over others. In general, shoot dry weight of Burn variety as affected by OM treatments was lower than those recoded for Spunta variety.

Tuber dry weight, Application of compost only (100% OM) in different treatments results in higher tuber dry weight than combination of 50%OM+ 50% CF. Superiority of spunta variety over Burn variety was occurred, although both of them were deferentially responded to composting treatments.

Tuber yield: Organic manure and mineral fertilizer treatments as well as compost treatments positively affected tuber yield of potato varieties. Both of them were differentially responded to compost treatments. Tuber yield of spunta variety was better than those of burn variety. Windrows T3 and T5 were the best among others in relation to potato varieties.

Nutrients uptake by potato varieties:

Nitrogen: Application of organic manure either solely or in combination with mineral fertilizer had enhanced N uptake by shoots. Nitrogen uptake by shoots of potato varieties was fluctuated according to compost treatments. Nitrogen uptake by shoots of Burn variety was lower than those uptake by shoots of spunta variety.

Tuber-N: N uptake by tuber, in general, was higher than those uptake by potato shoots. Spunta variety showed significant accumulation of nitrogen in tuber correlated to compost applications. Among the compost treatments, T_5 and T_2 seems to be the best ones. Similar trends were noticed with Burn variety but to lower extent.

Potassium: Potassium as one of the most effective nutrients for potato growth was frequently affected by fertilization strategies and compost treatments. The K uptake by shoots was enhanced by T_3 and T_5 while T_2 and T_6 showed lower content of K when compared to potato plants totally treated with mineral fertilizer. The overall average showed the superiority of combined treatment over individuals (100%CF or 100%OM). Generally, K uptake by shoots of Burn variety was significantly lower than those of spunta variety.

Tuber-K: Windrows T_1, T_3 and T_5 were the best while T_2, T_4 and T_6 were low. Severe reduction in K uptake by spunta tuber was recorded with T_6 as compared to plants totally treated with mineral fertilizer. Similar trends, but to low extent, were noticed with Burn variety. In conclusion, both of the two potato varieties had accumulated more K in tubers than those recorded with plant shoots.

Phosphorus: Spunta variety did not reflect any significant difference between either amendment combination or compost treatments when P uptake by shoots was considered. There was no significant difference between the two varieties when P uptake by shoots was considered.

Starch accumulation: Composted organic materials either applied solely or in combination with mineral fertilizer significantly affected starch content of tubers. Starch content in Burn tuber was to somewhat extent, lower than those recorded with Spunta variety. There was no big significant difference between totally organic treatment and combined one.

Nitrate accumulation: Nitrate content was frequently affected by compost treatments. The addition of organic materials, in different treatments, either alone or in combination with mineral fertilizer in ratio of 50%:50%, have an active and positive effect in reducing the quantities of NO_3^- uptake by tubers of both potato varieties. In this regard, low content of NO_3^- was detected in tubers of Burn variety when compared to Spunta variety.

Part three : Application of ^{15}N isotope dilution technique

Nitrogen derived from fertilizer (Ndff): Portion of Ndff gained by shoots was very low under compost treatments as compared to the totally mineral fertilized treatment. Portion of Ndff by tubers of both potato varieties was lower than those recorded with shoots. The best percent Ndff was recorded with windrows T1 and T3. Burn variety showed, in general, higher percent of Ndff than those recorded with spunta variety.

Nitrogen derived from organic compost (% Ndf comp): Compost treatments have a great effect on portions of N derived from organic manure. The great bulk of nitrogen uptake by shoots was