This study was suggested as an attempt to investigate the effect of different soil conditioners and fertilization levels on the growth, yield and some chemical composition of leaves and tubers as well as storageability of potato cv. Alfa, for this purpose two experiments were conducted at the Experimental Farm of the Faculty of Agriculture, Moshothor, Zagazig University during the two summer seasons of 1991 and 1992. The studied soil conditioners were applied at the times of soil preparation. The applied rates of sand, organic manure and sulphur were 30 m\(^3\), 30 m\(^3\) and 150 kg/fad. respectively. The soil conditioners were added as single, double (each two together) or all of the three used materials beside the control (without addition) to form eight treatments. The second studied factor was the fertilization level, i.e. three fertilization levels of N, P and K fertilizers. Fertilizers were applied to the soil in two equal portions at 35 and 60 days after planting. The three rates of NPK fertilizers were as follows:

1- (100 kg N + 30 kg P\(_{205}\) + 50 kg K\(_{20}\)/fad.), 2 (150 kg N + 60 kg P\(_{205}\) + 100 kg K\(_{20}\)) and 3 (200 kg N + 90 kg P\(_{205}\) + 150 kg K\(_{20}\)/fad.).

Each experiment included twenty four treatments which were resulted from the combinations between the eight soil conditioners within the three used fertilization levels. The experimental design was split plots in a complete randomized blocks with 4 replications for each treatment. The soil conditioner treatments were situated in main plots while the fertilization levels were randomly distributed in the sub-plots.

The obtained results, can be summarized as follows:

1. **Plant vegetative growth:**
   a- Plant height after one month was significantly increased with adding sand at the rate of 30 m\(^3\)/fad. in combination with NPK
fertilizers at the third used level (200 kg N + 90 kg P2O5 + 150 kg K2O/fad.).

b- Plant height after (3-month), fresh weight and dry weight of plants were significantly increased by application of organic manure at the rate of 30 m3/fad. in combination with the third level of NPK fertilizers.

2. Chemical composition of plant leaves:

Chemical composition of plant leaves, e.g. N, P, K and total hydrolizable carbohydrates significantly increased by application of organic manure and using the third level of NPK fertilizers.

3. Total yield and its components:

Total yield and its components of potato tubers, e.g. tuber weight, number of tubers per plant, total yield and marketable yield percentage significantly increased as follows:

Average tuber weight (g) and number of tubers per plant were significantly increased with application of organic manure in combination with the third level of NPK fertilizers, the total yield (ton/fad.) was increased by adding sand in combination with the third used level of NPK fertilizers while the percentage of marketable yield was significantly increased with the application of sand + sulphur mixture with using the third level of NPK fertilizers.

4. Tuber size:

The application of organic manure at 30 m3/fad. or using mixture of sand (30 m3) + sulphur (150 kg/fad.) in combination with the third used level of NPK fertilizers exerted a good influence on increasing the large tubers (46-60 mm) and decreasing the small tubers (35-45 mm) Percentage.

5. Chemical composition and dry matter percentage of tubers:

The application of organic manure at 30 m3 exerted a good influence on increasing all characteristics of Chemical
composition of tubers, e.g. dry matter %, N, P, K, reducing, non reducing and total sugars. The applied organic manure in combination with the third used level of NPK fertilizers increased dry matter, N, P, K and total sugars. Meanwhile, the mixture of (sand + organic manure) in combination with the first level of NPK fertilizers (100 kg N + 30 kg P2O5 + 50 kg K2O/fad.) exerted their effect on increasing the reducing sugars content. The behaviour of non reducing sugars responded well to the application of organic manure in combination with the third used level of NPK fertilizer, in the first season only.

6- Storageability:

Concerning storageability of potato tubers, i.e. decay, weight and total weight loss, it is evident that application of sand + organic manure mixture within using the first level of NPK fertilizers decreased decay and total weight loss. While the weight loss percentage was decreased with using organic manure and or using first level of NPK fertilizers.

Generally, it could be concluded from the aforementioned results that using organic manure in combination with the third used level of NPK fertilizers (200 kg N + 90 kg P2O5 + 150 kg K2O/fad.) offered a good vegetative growth, yield and nutritive value. Meanwhile, for the purpose of two months storageability the application of sand and organic manure mixture within the first level of fertilizers (100 kg N + 30 kg P2O5 + 50 kg K2O/fad.) could be recommended.