Potato production from true potato seed (TPS) is highly promising, and may put remarkable contribution for increasing potato production in Bangladesh. A series of experiments and thousands of demonstration trials of TPS during 1993 to 1997 have generated great enthusiasm among the potato farmers as well as consumers of Bangladesh. Still there are major problems associated with the use of this technique such as poor germination percentage, lack of uniform germination, poor survival rate of seedlings, lack of uniformity of tubers in terms of shape, size, and color. In order to exploit the merits of TPS a number of experiments have been undertaken.

Nutrient conditions in the potato mother plants directly affect the production of quality TPS. Therefore, experiments were conducted during 2004-2007 to examine the effects of combinations of different levels of nitrogen (N), phosphorus (P), and potassium (K) on yield and quality of TPS using crosses of ‘MF-II’ and ‘TPS-67’. Four levels of each of N (0, 150, 225, and 300 kg ha⁻¹) and P (0, 60, 120, and 180 kg ha⁻¹) were applied to MF-II for obtaining better flowering, berry setting, and TPS production. Out of the 16 treatment combinations, the highest 100-TPS weight (84.1 mg) was obtained with 300 kg N and 120 kg P ha⁻¹, while the highest TPS yield (136.1 kg ha⁻¹) was obtained with 225 kg N and 120 kg P ha⁻¹. Considering the findings of the previous study, 2 levels of N (225 and 300 kg ha⁻¹) and a fixed value of P (120 kg ha⁻¹) were selected as promising for TPS production. Twelve combinations of 3 N (0, 225, and 300 kg ha⁻¹, respectively) and 4 K (0, 125, 175, and 225 kg ha⁻¹, respectively) levels were also applied to MF-II to investigate the effects of yield components of TPS. The weight of 100-TPS increased with increasing N rate but decreased with increasing K rate. The highest 100-TPS weight (83.8 mg) and maximum quantity (113.0 kg ha⁻¹) of quality (>1.18 mm) TPS were obtained with the application of 300 kg N and 125 kg K ha⁻¹, while 225 kg N and 125 kg K ha⁻¹ produced the highest TPS yield (145.3 kg ha⁻¹).

TPS that was produced from above mentioned 12 different fertilizer combinations were then used for nutritional analysis, germination tests in vitro, and growth performance in nursery beds. Large size TPS (>1.18 mm) produced from 300 kg N and 125 kg K ha⁻¹ gave the highest emergence rate (94%), seedling vigor
(4.8), and dry matter content (10.5%) of seedling in nursery beds. Considering the present results together with those of the previous studies, it can be concluded that the combination of 300 kg N, 120 kg P and 125 kg K ha⁻¹ was the most suitable for the production of high quality TPS.

A field experiment was also carried out to evaluate the relative economic return as influenced by supplemental N (0-250 kg ha⁻¹) and planting density (8-16 haulms m⁻²) in MF-II. Most parameters showed maximum values when 0 to 150 kg N ha⁻¹ was applied, but the values decreased thereafter as supplemental N application increased. Although only the weight of 100-TPS showed a maximum value at 250 kg N ha⁻¹, the value was similar to that at 200 kg N ha⁻¹. A positive effect of higher planting density was detected only in the number of berries plant⁻¹ and yield of TPS. The combination effect of supplemental N and planting density on the yield of berries and TPS was significant. Although the total yield of TPS was the highest at the combination of 150 N kg ha⁻¹ and 16 stems m⁻², the yield of high quality TPS, was the highest at the combination of 200 N kg ha⁻¹ and 12 stems m⁻². The benefit cost ratio also showed that the combination of 200 kg supplemental N ha⁻¹ and 12 stems m⁻² was the optimal growth conditions to harvest high quality TPS. Therefore, in the commercial aspect, 200 kg N ha⁻¹ of supplemental application in 7 separate installments at 7 day intervals starting from just before blooming along with basal application (150-120-125-120-12-6 kg ha⁻¹, N-P-K-Gypsum-ZnSO₄-Borax, and 10 t ha⁻¹ farm yard manure) and 12 stems m⁻² is the most suitable combination to produce high quality TPS from ♀MF-II X ♂TPS-67.