The shearing, the high temperature and high pressure promote starch gelatinization on the extrusion processing. The pre-gelatinization process is one which assists in forming a uniform matrix and facilitates the stabilization of food without gluten. This study was designed to determine the optimal thermoplastic extrusion parameters for obtaining pre-gelatinized flour for use for example, in pasta without gluten. Were designed 11 treatments by central composite rotational design for extrusion of a blend (1:1) of grain millet (*Pennisetum glaucum*) and corn grits mixing, varying moisture and temperature. It was determined water absorption index (WAI) and water solubility index (WSI). It was used the program Statistic 7.0 for statistical analysis. WAI values ranged from 5.10 to 7.52g of gel (g of dry matter). The model equation was $y=7.4339-0.46x_1-0.43x_1^2 - 0.48x_2 + 0.39 x_1x_2$, with significant difference for moisture and temperature linear quadratic. The model equation for WSI was $y=17.04-3.26x_1-1.02x_1^2-2.33x_2^2$, and significant for moisture linear and quadratic temperature. The peak of WSI was for treatment with 11g.100g$^{-1}$ moisture and 90°C temperature. The WAI and WSI were higher in flours in relation to the raw flours. WAI is related to the gel forming ability of starch molecules, as the WSI is a parameter which reflects the degree of degradation of the starch granule. Thus, the higher the WSI and the WAI, the greater the gelatinization of the starch, these two parameters were used to identify optimal pre-gelatinized flour. This product can be used in different situations in the food industry.