We present the results of observations of cold IRAS sources in the Galactic disk area, $-10^\circ < l < 100^\circ$ and $|b| < 5^\circ$, in the SiO $J = 1-0$, $v = 1$ and 2 maser lines. SiO masers were detected in 51 out of 143 observed sources; 45 were new detections in SiO masers. The selected IRAS sources were objects with dust temperatures of between 160 and 280 K. According to a confirmation using 2MASS near-infrared images, a majority of the sample are AGB or post-AGB stars, although dense cores in the star-forming regions (or dusty Hii regions) are involved in part of the sample. Among new detections, two were candidates for post-AGB stars: IRAS 18450$-$0148 (W 43A), and 19312+1950. We found that the intensity ratios of the SiO $J = 1-0$, $v = 2$ to the $v = 1$ line of the objects clearly correlate with those IRAS colors. The detection rates of SiO masers tend to increase toward the Galactic center as well as the cases of previous SiO maser surveys of typical AGB stars. No strong associations of the objects to the spiral arms were found. The radial-velocity dispersion of the present sample is comparable with the dispersion of the SiO maser sample of typical AGB stars. These facts suggest that the present sample of cold IRAS sources with SiO masers has a kinematic property very similar with that of typical AGB stars.