**Supplementary file 1**

**Result of larval, pupal and total developmental time, and pupal and adult weight**

We found significant differences among populations in larval time (χ2 = 60.17, d. f. = 2, p = 8.6e-14), pupal time (χ2 = 285.9, d. f. = 2, p < 2e-16) and total developmental time (χ2 = 206.1, d. f. = 2, p < 2.2e-16); all development times in the southern China population were longer than those of the central and northern China populations (Fig. S1). All development times significantly decreased with increasing temperatures (larval time: χ2 = 2410.5, d. f. = 2, p<2.2e-16; pupal time: χ2 =6734.2, d. f. = 2, p< 2.2e-16; total time: χ2 = 6734.2, d. f. = 2, p < 2.2e-16). Population differences were significantly affected by the temperature for larval time (population × temperature: χ2 = 10.4, d. f. = 4, p = 0.03), pupal time (population × temperature: χ2 = 127.3, d. f. = 4, p < 2e-16) and total time (population × temperature: χ2 = 32.9, d. f. = 4, p = 1.285e-06), suggesting different phenotypic plasticity in response to temperature among populations. Significant sex differences were not found in larval time (χ2 = 0.13, d. f. = 1, p = 0.72), but differences were found in pupal time (χ2 = 212.7, d. f. = 1, p < 2.2e-16) and total time (χ2 = 41.0, d. f. = 1, p = 1.5e-10). Sex differences in pupal time were significantly affected by temperature (sex × temperature: χ2 = 76.2, d. f. = 2, p < 2e-16), but not by population (sex × temperature: χ2 = 5.8, d. f. = 2, p =0.053). Sex differences in total time were significantly affected by temperature (sex × temperature: χ2 = 11.5, d. f. = 2, p = 0.003) but not by population (sex × temperature: χ2 = 2.6, d. f. = 2, p = 0.28).

We found that pupal weight was significantly different among populations (χ2 = 20.7, d. f. = 2, p = 3.2e-05) and significantly decreased with increasing temperature (χ2 = 95.8, d. f. = 2, p < 2.2e-16) (Fig. 2). There was also a significant interaction between population and temperature (χ2 = 18.1, d. f. = 4, p = 0.001), which suggests different phenotypic plasticity in response to temperature among populations. For example, at 20 and 25 °C, the southern population is the largest, the central China population is intermediate, and the northern China population is the smallest, while the northern China population is larger than the both central and southern China populations at 30 °C (Fig. S2). Sex differences in pupal weight were also found (χ2 = 6.7, d. f. = 1, p = 0.009), showing a male-biased sexual size dimorphism. However, the sex difference was not affected by either population (sex × population: χ2 = 0.36, d. f. = 2, p = 0.84) or temperature (sex × temperature: χ2 = 1.1, d. f. = 2, p = 0.59).

The adult weight was also significantly affected by population (χ2 = 26.51, d. f. = 2, p = 1.75e-06) and temperature (χ2 = 233.47, d. f. = 2, p < 2.2e-16), but without showing sex differences (χ2 = 0.03, d. f. = 1, p = 0.87) (Fig. S2). Population differences were significantly affected by temperature (χ2 = 39.16, d. f. = 4, p = 6.46e-08). At 20 °C, the highest adult weight was found in the southern China population, it was intermediate in the northern China population, and lowest in the central China population in both females and males. There were no significant differences found among populations at 25 °C in both females and males (all p > 0.05). At 30 °C, the adult weight in the northern China population was significantly higher than that of both the central and southern China populations.



**Fig. S1** Larval development time, pupal time and total development time (larval + pupal time) in *Helicoverpa armigera* females and males in relation to temperature and population. Error bars indicate SE.



**Fig. S2** Pupal weight and adult weight in *Helicoverpa armigera* females and males in relation to temperature and population. Error bars indicate SE.



**Figure S3** Daily mean temperature (°C) of three collection sites from northern, central and southern China. Data were collected by local weather stations from 2001-2010.