Table 3 shows the integrated growth ratios. The first four have ratios higher than 0.08; C. changii, C. nitidissima, C. oleifera, C. hongkongensis and are considered to be pollution resistant: the growth rate of 0.74 for C. caudata shows it is middling tolerant species.

3 Discussions
The resistant capability to fluoride and sulfur dioxide in five species of camellia plants was tested by growth index evaluation. The results of resistance research of C. oleifera in our study were consistent with previous researches, which agree that C. oleifera has strong resistance to sulfur fluoride and sulfur dioxide. However, our research indicates that C. changii and C. nitidissima have stronger resistance than C. oleifera. Except for C. caudata, the other four kinds of camellia plants have a comprehensive growth ratio greater than 0.80, and therefore all belong to the resistant plant category. C. caudata is defined as having middle resistance to sulfur dioxide and fluoride. The survival rate of the camellia plants tested in clean areas and polluted areas was 100%, which shows that the plants had adapted to their new environment during the year of testing. New research will be made into the mechanisms of change.

In addition to being used for gardens and for commercial purposes, camellia plants have strong resistance to atmospheric fluoride and sulfur dioxide pollution. At present, levels of development and utilization of many kinds of camellia plants are low, apart from C. oleifera and C. nitidissima, which are widely planted. In our study, C. changii, C. hongkongensis and C. caudata also show resistance to sulfur dioxide and fluoride, which can be greatly exploited.

New hope for breeding new varieties with Camellia chuangtsoensis
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A field survey was conducted at Long Liu Depot, Ma’An village, one of the habitats of Camellia chuangtsoensis. A comparative study was made among C. chuangtsoensis, C. ptilosperma and C. longzhouensis. The species scions were successfully grafted for propagation purposes under continuous observation. The success rate of grafting was over 90%. Leaf mutations on a graft were observed. We found that successful pollination could be made between Camellia chuangtsoensis and C. azalea as well as between C. chuangtsoensis and C. reticulata hybrids. We successfully obtained the first four seedlings in cultivation with C. chuangtsoensis as parent plant.

1 Discovery of Camellia chuangtsoensis

Flower of Camellia chuangtsoensis
Petals of C. chuangtsoensis
Illustration of *C. chuangtsoensis*

Mr. Huang Liandong purchased one wild yellow camellia plant in a street market and this plant flowered in the summer of the following year. Mr. Huang was excited by its small leaves, numerous petals and color. He was told by local growers that this kind of plants was distributed in distant hills at Chongzuo City. He therefore decided to investigate this species at a mountainous village called Longliutun, together with staff from Chongzu Forestry Design Academy, and he collected some specimen plants. Following intensive comparisons and further research, he then published this as a new species of genus *Camellia* of Sect. Chrysantha Chang in the proceedings of the Annual China Breeding Group Symposium, with the famous taxonomist Prof Liang Shengye as co-author. It is a new yellow *Camellia* species that blooms all the year round in Guangxi.

### 2 Comparisons with *C. ptilosperma* in morphological characteristics

There are two species that flower all the year round, i.e. *C. ptilosperma* and *C. chuangtsoensis*, but they are totally different from each other in flower color, flower form, shape of petals, flower size, flowering period and shape of leaves.

Color of flower: light yellow for *C. ptilosperma*, with purple stripes or spots on petals, but deep yellow or yellow for *C. chuangtsoensis* with pure color and no spots.

Flower form: single form for *C. ptilosperma*, and single to semi-double form for the latter with two row petals.

Number of Petals: 5~7 for the former and 13~15 for the latter.

Flower size: usually diameter 3.5~4.5cm for the former, and 5~6 cm for the latter.

Flowering period: *C. ptilosperma* usually starting flowering in May, in full bloom through July to August, occasionally flowering from December to next January in Nanning. *C. chuangtsoensis*; the flowering period is from January and February, in full bloom through March to June, continuously flowering through July to September with the high summer temperature: flowering declines during October and December. So its flowering period lasts for more than 300 days during a year and therefore yellow flowers are blooming almost all of the year.

Leaves: 7~13.5cm long and 3~5 cm wide in *C. ptilosperma*, and smaller leaves in *C. chuangtsoensis*, 7~11cm long and 3~4cm wide.

Based on above descriptions of *C. ptilosperma*, this species is typical of golden flower camellias, with smaller leaves, dense shoots and compact plants. All these unique characteristics will not only provide us with a new opportunity to develop the ornamental industry, but also gives new hope for breeding new yellow camellia cultivars.
So far, no breeding results on *C. chuangtsoensis* have been published worldwide. In 2010, Mr. John Wang made a cross between *C. chuangtsoensis* and a white *C. reticulata* hybrid (No.1 hybrid) bred by himself. He harvested a fruit with two seeds. He raised three seedlings grafted with young shoots from the hybrid at different stages. The tallest is about 160cm and shortest about 40cm. The tallest seedling (No.1) has similar leaves to *C. reticulata*, and has not started flowering yet.
Tallest hybrid seedling at height of 160cm

Young hybrid fruit between *C. changii* x *C. chuangtsoensis* by Mr. Huang in Nanning

In recent years, Mr. Huang Liandong has conducted hybridization between *C. changii* (*C. azalea*) and *C. chuangtsoensis*. He made a cross between *C. changii* as father parent and *C. chuangtsoensis* as mother parent in July 2010. He also tried to conduct reciprocal crosses with mother parent of *C. changii* and successfully harvested fruits. He has raised the hybrid seedlings up to 10cm tall.

I conducted reciprocal crosses between *C. chuangtsoensis* and *C. changii* on 23 August 2012, and have been successful in obtaining young fruits.

4 Conclusions

We have grafted *C. chuangtsoensis* to rootstocks of *C. japonica* ‘Hongluzheng’ with high compatibility. Three years ago I introduced some shoots and have raised more than 30 *C. chuangtsoensis* saplings in my nursery. This year I grafted another large batch with a survival rate of over 90%, and estimate having up to one hundred *C. chuangtsoensis* seedlings in 2013.

The young grafted *C. chuangtsoensis* sapling has a shrubby and compact plant form with flowers facing slightly downwards, and some saplings have variegated leaves. The color of young leaves is a shining purplish red when saplings are sprouting new shoots.

The pollen of *C. chuangtsoensis* needs to be stored in appropriate condition so as to obtain high seed bearing crosses with *C. changii*.

There is a very short maturation period for fruits, which ripens in two months, but long germination period of up to four months.