

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

Results of the study could be summarized as follows:

1) The morphological characteristics were different among lines/cultivar. Due to the first flowering date, line No.5 was classified in to the earliness, while the line P309 was the lateness. In case of vine height, lines P185, P309 and cultivar Fang No.7 were classified into determinate type while lines No.3, No.4 and No.5 were semi-determinate and line P117 was indeterminate type (bush type). In addition, in this study, the highest plant height, number of nodes and branches was found in line P185.

2) Pod characteristics could be divided into three groups; group I, for edible seed *i.e.* lines P117 and P185, group II, for edible pod *i.e.* lines No.3, No.4, No.5 and cultivar Fang No.7 and group III, pod was likely for edible pod but slightly inflate and fiber *i.e.* line P309. The longest pod length was line No.3, No.4 and cultivar Fang No.7 whereas the widest pod width was line No.4 and the greatest seed number per pod was cultivar Fang No.7, lines P309, No.4 and P117 whereas the least seed number per pod was line No.5.

3) Field phenotypic evaluation to powdery mildew resistance of 7 pea lines/cultivar at Pang Da Royal Agricultural Station during winter season could be classified into three groups; highly resistant group *i.e.* lines P117, P185 and P309, moderately resistant group *i.e.* lines No.3, No.4 and No.5 and susceptible group *i.e.*

cultivar Fang No.7. Whereas greenhouse phenotypic evaluation at Inthanon Station, all 7 pea lines/cultivars were susceptible to powdery mildew.

4) Screening primer for powdery mildew resistant linkage DNA marker showed only the SCAR primer, ScOPD-10 could amplify polymorphic band DNA marker size 850 bp which appeared only in the powdery mildew resistant plant of the lines P117, P185 and P309 by visual in the field condition. The comparison of sequencing fragments at 850 bp with DNA sequences database at National Center for Biotechnology Information (NCBI) GenBank. After BLAST searches of the sequences, the 618-, 621-, and 624- base sequences showed the same 91, 90, and 91% homology, respectively, to complete sequence of *P. sativum*. From the effectiveness of this primer, it was used to confirm the resistant plant in the field in this breeding program.

5) Line P309, when used in breeding program, could give F₁ progenies that had pod characteristics similar to snow pea pod. Therefore, four crosses derived from this line, No.3 × P309, P309 × No.4, No.5 × P309 and Fang No.7 × P309, were selected to use in backcross breeding program.

6) The confirmation of phenotypic resistant hybrid plants using PCR technique, primer SCOPD-10 showed percentage of corrected screening of resistant plant was between 70-100%. In conclusion, this study demonstrated that PCR technique was very effective in genetic identification among 7 pea lines/cultivar and to reveal genetic relationship of the pea parents and their progenies.

7) The comparison of morphological characteristics among lines of BC₃F₃ hybrids and their parents was done at 2 locations, Khun Wang Royal Project Development Centre and Ang Khang Royal Agricultural Station. It was found that

BC₃F₃ progenies inherited similar characteristics to recurrent parents. For example, BC₃F₃ progenies derived from No.5 x P309 were the earliness, which was similar to line No.5, whereas three BC₃F₃ progenies derived from No.3 x P309, P309 x No.4 and Fang No.7 x P309 were lateness as their parent lines P309, No.3, No.4, and cultivar Fang No.7.

At Khun Wang Royal Project Development Center, the longest pod length and the widest pod width was found in lines No.3, No.5 and cultivar Fang No.7, BC₃F₃ progenies derived from No.3 x P309, P309 x No.4 and Fang No.7 x P309, whereas the greatest number of pod per plant and total pod weight per plant was found in four new lines, BC₃F₃ progenies derived from No.3 x P309, P309 x No.4, No.5 x P309, Fang No.7 x P309. At Ang Khang Royal Agricultural Station, number of pod per plant of BC₃F₃ progenies was not different from their parental lines/cultivar.

8) Powdery mildew resistant evaluation was conducted at 2 locations, at Khun Wang Royal Project Development Center, it was found that four lines of BC₃F₃ progenies backcross hybrids, BC₃F₃ progenies derived from No.3 x P309, BC₃F₃ derived from P309 x No.4, BC₃F₃ derived from No.5 x P309 and BC₃F₃ derived from Fang No.7 x P309 showed highly resistance to powdery mildew as their parent line P309. On the other hand, at Ang Khang Royal Agricultural Station, all BC₃F₃ progenies and their parental lines were susceptible to powdery mildew.

9) Fresh pods of all BC₃F₃ progenies and their parents were tested by consumers. The result showed that consumers preferred line P309 to others on pod size, shape and color whereas BC₃F₃ progenies derived from No.5 x P309 gave better

crispness. While BC₃F₃ progenies derived from Fang No.7 × P309 was the best in term of sweetness and scent.

In addition, if possible, it is better to choose donor parent that have good characteristics as well as interested gene.

6.2 Recommendations

1) Although improvement for disease resistance in plant is the main objective for breeding program, however morphological characteristics and yield are still important and should be considered. In some case resistant gene linked with some other undesirable traits, if they are chose as a parental, it will lead to be troublesome in breeding program. Therefore, the morphological characteristics of germplasm which are used as parental plant should be screened to be closely to the ideal target prior to establish the new disease resistant line. These will assist in short duration of breeding program, reduce the cost and promote the higher chance of the successful in establishment of new line.

2) Evaluation of parental plant to be used in breeding program should be conducted in several locations and should be done in different seasons. The result will assist in selecting good parent line. Since environments and different races of disease will give different result during the screening period. Thus, parental plants that can perform well in various locations and seasons, will provide good genotype to the progenies. Therefore, breeder can develop good line/variety.

3) The proper environment for powdery mildew resistance testing should be arranged, the equilibrium inoculums will lead to get the actual result, in case of less or

over dose of inoculums, errorness during selection could be occurred. The study of suitable dose of inoculums should be studied before doing trials.

4) Phenotypic selection along with molecular marker as a confirmation will enhance the effectiveness of resistant plant screening. However, there are many important limited factors in successful of using DNA marker. For example, taking sample for DNA exaction, leaf should be free from disease otherwise, dirty leaves, especially contaminated with disease would yield contaminated DNA and yield no band.

5) Primer SCOPD10 could be used to screen the resistant snow pea in Thailand by detecting polymorphic band at 850 bps. In the future, the sequence of this band should be used to design specific nucleotide with restriction enzyme to distinguish between resistant and susceptible snow pea plant in Thailand.

6) Although resistant line was established, planting season such as winter or summer, would be better for snow pea production, since powdery mildew spread very fast and damage the crop more in favorable climate like rainy season.

7) Evaluation snow pea lines for suitable production area should be conducted before introducing the new resistance variety to farmers in order to avoid any failure of production.

8) In this study, BC₃F₃ progenies contain resistant powdery mildew gene were established and their pod character was similar to recurrent parent. However, some character such as height still has slightly non-uniform. Thus, backcross should be further conducted in order to increase uniformity of this trait.

9) Other factors, such as soil and fertilizer management, and integrated pest management should be taken into account on snow pea production. With the use of

resistance variety along with those proper management, snow pea production in Thailand should be increased. Thus, the amount of imported snow pea from China would be cut down. In addition, by using resistance variety Thai farmers have an opportunity to produce snow pea for local consumption and in the future, with good cultivation technology of snow pea, Thai farmer might be able to export snow pea to other countries.