

Recent Crop Science Research in Japan

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Introduction

The Crop Science Society of Japan has 76 years of history and publishes two own journals quarterly, i.e. Japanese Journal of Crop Science (JC) and Plant Production Science (PPS). The former has attained 72 volumes and the latter, 6 volumes this year. More than 6 years ago, the JC contained both articles written in Japanese with English summary and English with Japanese summary but after the commencement of the full English journal as PPS, all the English papers moved to PPS. Annual average pages of JC and PPS are approximately 620 and 370, respectively, and both journals are registered in the database of the Institute for Scientific Information (ISI).

I have examined these journal contents published recent three years (2000, 2001, 2002) and found not only some characteristics of Japanese studies but also differences in the journal contents. These two publications may not show the true frontiers and may not totally reflect the crop science research in Japan because some kinds of research were reported at the annual meeting only and/or published outside Japan. However, I have confidence that I may not misjudge about current trend of the crop science research in Japan.

Contributors of two journals

As often seen in academic publications, the majority of contributors are from universities (61% of total articles calculated from the first authors) and followed by national institutes/experiment stations (17%), prefecture institutes/experiment stations (10%), private company (4%) and those from foreign countries (8%). In case of PPS, the occupations by contributors from universities and foreign countries are higher (69% and 15%, respectively) and in JC, those by national institutes/experiment stations and prefecture institutes/experiment stations are higher (24% and 16%, respectively) than the total average.

Percentage occupation by categorized research field

During the past three years, 367 papers (original article, short communication, technical report, review article) have been published in two journals. According to the criterion

adopted by JC, there are six rough categories, i.e., ①crop cultivation, ②crop quality and processing, ③variety and genetic resource, ④crop physiology and biotechnology, ⑤yield forecasting, information processing and environment, and ⑥morphology. Though the criterion in PPS is different from that of JC, the statistics to PPS is arranged according to JC.

Among total 367 papers, the percentage occupations by six categories are as follows: ① = 21, ② = 6, ③ = 13, ④ = 37, ⑤ = 10 and ⑥ = 13. When we separate these into JC- and PPS-based statistics, we find very different features between two journals. In JC, it is shown that ① = 27, ② = 10, ③ = 18, ④ = 20, ⑤ = 15 and ⑥ = 11. As the traditional and standard journal, I can recognize that JC has a balanced contribution from the six categorized research fields. In PPS, on the contrary, the percentage occupations by six categories are as follows: ① = 14, ② = 2, ③ = 8, ④ = 56, ⑤ = 4 and ⑥ = 15.

Characteristics of research field and the difference between JC and PPS

As a whole, crop cultivation (①) and its incidental physiological analysis (④) are major research fields, and often their varietal differences (③) are accompanied. During these three years, results related to biotechnology and molecular biology of crop plants are reported but they are still minor in our society as compared with the outcome from the Japanese Society of Breeding.

In JC, articles related to ① occupies the major position and followed by ④ and ③. On the contrary in PPS, articles related to ④ exceeds a half of all articles and the second position is ⑥ and ①. This difference is due to the affiliation of authors. The authors of JC are spread to university, national institute/experiment station, prefecture experiment station and sometimes extension center. However in PPS, major contributors are belonging to universities and conducting advanced studies with rather 'pure crop-science'. Among ④, photosynthesis, respiration and physiology of dry matter production still occupy a stable position in both journals. Until present time inquiries from outside Japan are more in JC than in PPS because the former is well known and contains more useful information especially for scientists living in Asian countries.

Crops species examined in the research

According to the statistics on the crop species, our research is concentrated into cereals (73% of the total studies), followed by pulses (10%), root and tuber crops (5%). Crops other

than above three categories occupy 9% and articles without treating crops are 3%. The tendency of crops appeared in JC and PPS is not much different.

Traditionally, Japanese crop science has been established during the study of rice cultivation so that inevitably, major crop is rice (77% of cereals and 56% of all crops studied). The second frequent crop is wheat (12% of cereals and 9% of all crops), the third is soybean (63% of pulses and 6% of all crops), and the fourth is corn (5% of cereals), followed by buckwheat, sweet potato and sugarcane. Crops with minor appearance are barley, sorghum, mung bean, cowpea, tea, taro, yam, edible canna, potato, konjak, broad bean, kidney bean, sugar beet, mulberry, pearl millet, cassava, adzuki bean, groundnut, *Crotalaria*, *Zoysia*, safflower, sago palm, napiergrass, pineapple, banana, *Capsicum*, onion, tomato, melon, spinach and weed (*Cyperus*).

Agricultural economy discourages our activity

In Japan, the self-sufficiency of foods is 40% (calorie base, 2001) in contrast to that of 125% in USA, 132% in France, 96% in Germany and 74% in UK. The self-sufficiency of major staple cereals is 60% which is based on the annual consumption of 63.6 kg rice per person, but that of total cereal (including those of animal feeding) is only 28%. The background of these situations is huge quantities of imported crops. In Japan, the import of agricultural products attains at $42,992 \times 10^8$ Yen and the export is only $3,020 \times 10^8$ Yen. Of $29,499 \times 10^3$ t imported crops, the major ones are corn ($16,221 \times 10^3$ t ; $2,370 \times 10^8$ Yen), wheat ($5,521 \times 10^3$ t ; $1,260 \times 10^8$ Yen), soybean ($4,831 \times 10^3$ t ; $1,421 \times 10^8$ Yen) and sorghum ($1,908 \times 10^3$ t ; 267×10^8 Yen). Furthermore, more than 9×10^5 ha of rice fields are converted to other crop fields or simply non-cropping. These situations are detrimental for the enthusiasm in our research to obtain higher yield of crops and tend to make research toward to higher technological field in the laboratory at the sacrifice of production field. How to overcome these are currently our large problem against our crop research but it seems to me too political to solve. In the future, ordinary crop production may not sustain population growth so that we must proceed the development of strong, rational crop production technology with low input but high output.

More precise evaluation will be shown at the meeting of Korean Society of Crop Science.