Occurrence of Diseases and Case of Clinical Diagnosis on Watermelon in South Korea, 2008–2012

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The socio-network activities for regional governments, agricultural research institutes, developing agencies and policy makers of any countries are very crucial and important to take into account the root cause of current problems faced by farmers. The survey was conducted in South Korea during the period January, 2008 to August, 2012 in order to shed light on prevalence of different diseases on watermelon in different regions and to better understand farmers’ knowledge and perceptions for following watermelon’s growing procedures and practices. A total of 590 cases were reported on 573 watermelon growers with highest 87.1% in Jeonbuk, 4.7% in Jeonnam, and 8.2% in other regions such as Gyeongbuk, Gyeongnam, Chungnam, Gwangju, Gyeonggi, Daegu, Gangwon, Changwon and Seoul. The maximum percentages of cases recorded were related to diseases and insect pest (38.6%) followed by physiological disorder (29.7%), cultural practices (18.8%), soil and fertilizer (9.0%), herbicide (2.9%) and others (1.0%). It was observed that the manifestation aspects of the diseases were changed due to increasing in proportion of ‘in-facility’ cultivation to 12,995 ha compared to ‘open-field’ cultivation (2,722 ha). The present survey revealed the necessity to reduce the damages incurred at watermelon farms as soon as possible through the breeding program to develop resistant cultivar, use of pathogen-free propagating plants, and efficient prevention of pathogen by regular monitoring of watermelon plants at farms.

Keywords: Farmers, Misconception, Monitoring, Network, Prevention

Introduction

The socio-network activities for regional governments, agricultural research institutes, developing agencies and policy makers of any countries are very crucial and important to take into account the root cause of current problems faced by farmers, find linkages, and points to the urgent needs and priorities to take necessary steps. These collective activities are recommended to be part of daily routine to amplify the chances of interception and relocation of resources to farmers in urgent need. The pool data collected with this kind of approach also helps to emphasize the necessity to deal with relevant problem faced by farmers with higher environmental impact.

Watermelon is one of the important cash crops in South Korea, the ninth largest watermelon producing country after China, India and United States. The production of watermelon was 608,986 tonnes with yield 38.75 tonnes/ha. The gross production value for watermelon in South Korea was $69,375,080 with cultivation area of 15,717 ha (FAO, 2011). The cultivation area was peaked at 45,207 ha in 1995, but it has declined in each successive year (Park and Cho, 2013). Various fungi (Ali et al., 2012a) and viruses are major plant pathogens caused dramatic problems in watermelon (Bananaj and Vahdat, 2008; Ali et al., 2012a; Ali et al., 2012b). Present commercial cultivars have been found to be susceptible to one or other kind of diseases. The priorities of breeders have been shifted from high yielding...
and high quality fruits to resistance to biotic and abiotic stresses for greenhouse culture. Disease control has been accomplished in South Korea, mainly, by grafting watermelon on bottle gourd or pumpkin, but, grafting is accompanied by higher labour costs and reduced fruit quality. During last some of years various problems related to diseases were reflected again during farmer’s interaction at farm field. To study impact of damage incurred on crop by different types of diseases, a survey was planned under the supervision of Jeollabuk-do Agricultural Research and Extension Services (JBARES), Korea Institute of Planning and Evaluation for technology in Food, Agriculture, Forestry and Fisheries (IPET) and Rural Development Association (RDA).

The main objective of the survey was to shed light on prevalence of different diseases in watermelon crop in different regions and to better understand farmers’ knowledge and perceptions for following watermelon’s growing procedures and practices. The survey was conducted to study the occurrence of different diseases in watermelon crop at Jeonbuk province in South Korea during the period January, 2008 to August, 2012. The team members of this survey programme were researchers specialized in field of agronomy, plant pathology and plant breeding from Watermelon Experiment Station (JBARES), Gochang, Jeollabuk-do, South Korea. During the survey, data were purposed to be collected from different regions of provinces to pool the statistical data for the use of research activities so as to find the key solution for newly erupted diseases, and provide control measures to farmers for the diseases commonly occurring on watermelon farm.

I. This survey was carried out at five hundred-seventy watermelon growers’ fields in Jeonbuk, Jeonnam, Gyeongbuk, Gyeongnam, Chungnam, Gwangju, Gyeonggi, Daegu, Gangwon, Changwon and Seoul (Fig. 1). The consultation was distributed into six different categories as diseases and insect pests, physiological disorder, cultural practices, soil and fertilizer, herbicides and others.

II. The questionnaire regarding different problems of diseases were collected and answered on phones, by visiting farm or interviewing farmers visiting with infected samples. The results provided here are of exploratory nature, and offer an outline to develop insights to prompt future analysis in this direction.

Domestic records of species in South Korea. A total of 590 cases were reported on 573 watermelon growers with highest 87.1% in Jeonbuk, 4.7% in Jeonnam, and 8.2% in other regions of Gyeongbuk, Gyeongnam, Chungnam, Gwangju, Gyeonggi, Daegu, Gangwon, Changwon and Seoul. Those observed farms showed damages caused by plant pathogens (bacteria, fungi and viruses) and other factors included harmful insects, cultural problems, physiological problems, soil fertilizer, herbicides, and others. Fluctuation of frequency of damaged cases based on each cause was observed from year to year. Number of viral diseases emerged cases were declined from 2008 to 2011, but increasing in 2012 that appeared contrary to physiological problems that increasing from 2008–2009 and continually decreased from 2009–2012 (Table 1). Total damaged cases were varied with the highest average frequency of diseases and insect pests (38.6%) that included fungi (16.6%), viruses (14.2%) harmful insects (6.3%), and bacteria (1.5%), followed by physiological disorder (29.7%), cultural practices (18.8%), soil and fertilizer (9.0%), herbicides (2.9%) and others (1.0%) (Fig. 2). A total of twenty nine domestic types of diseases are known as the causes of damages in watermelon. These includes nine types of viruses mainly, Cucumber green mottle mosaic virus (CGMMV), Kyuri green mottle mosaic virus (KGMVM), Zucchini green mottle mosaic virus (ZGMVM), Cucumber mosaic virus (CMV), Papaya ring spot virus (PRSV), Watermelon mosaic virus (WMV-1 and WMV-2), Melon necrotic spot virus, (MNSV), Zucchini yellow mosaic virus (ZYMV), two bacterial types (bacterial fruit blotch and bacterial leaf spot), eighteen fungi types (leaf blight, grey mold, leaf spot, scab, anthracose, gummy stem rot, Fusarium wilt, fruit rot, root rot, Myrothecium leaf spot, blue mold, leaf spot, fruit and vine rot, downy mildew, damping off, Sclerotinia rot, fruit rot, and powdery mildew), and others like southern root-knot.

Prevalence of latest diseases. During last five years, production of watermelon was found severely affected by incidence of viral diseases (36.8%). This has emerged as a major issue of consultation among watermelon growers (Fig. 3a). The questions on new strains of viruses including CGMMV, MNSV, PRSV and BFB and seed-borne contagious diseases were most frequently requested by the farmers in the regions of Jeonbuk. The dam-

![Fig. 1. Regional distribution of consulting in South Korea: Jeonbuk (87.1%), Jeonnam (4.7%), Gyeongbuk (2.8%), Gyeongnam (1.9%), Chungnam (1.6%), Gwangju (0.7%), Gyeonggi (0.5%), Changwon (0.2%), Daegu (0.2%), Gangwon (0.2%), and Seoul (0.2%).](image-url)