

Reduction of waste, means to sustainability via economical management of agriculture produce surplus, in Israel

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Introduction: By 2050 the world population will reach 9 billion, leading to a 70% increase in food production. (FAO 2009; 2011). Resources for food production are becoming scarce as food supply grows at a slower pace than the world population (Hodges et al., 2011). Throughout the food system, estimates show that between 30 and 40 percent of food is wasted (Godfray et al., 2010). Food loss creates negative externalities that arise throughout the entire food supply chain which adversely impact society and the environment (Hall et al., 2009). Agricultural surpluses impose an environmental burden from two aspects - there is a need for resources to produce them (land, water, fertilizers, labour, etc.) and to dispose of them. When food waste is landfilled and decomposes anaerobically, methane gas is generated which has 25 times the global warming potential of CO₂ (EPA, 2011). Food loss occurs at the post-harvest, processing and production stages in the food supply chain, and refers to the decrease in edible food that was meant for human consumption. Agricultural surpluses/ food loss occur as a result of inefficiencies in the food supply chain arising for example from a lack of knowledge, skills, technological means and access to the market and exceptional natural disasters (Schneider, 2008). A 2012 global examination showed that around 25% of the global food crops in terms of food supply are lost or wasted (Kummu et al., 2012).

In Israel, food is the third largest expenditure of households, (averaging monthly to about 600 US\$) and almost 20% of it are fruits and vegetables. Annual per capita vegetable consumption is about 180 kg, with a similar amount of fruit consumed, i.e, about 1 kg of fruits and vegetables per person per day. Household expenditure on fresh fruits and vegetables, from their total expenditure on consumption, is about 3.2% in the lowest quintile while it is 1.5% in the highest quintile. About 3.8 million tons of vegetables and fruits are grown in Israel each year for local consumption (CBS, 2014). Given that from the 3.8 million tons there are surplus agricultural produce, in the pre/postharvest stage in particular, thus the purpose of the study is to assess the losses, map the scope of the surplus problem and find means to better manage them, if formed.

Methods: The methods comprised of examination of various official existing data as document/activity analysis, interviews with experts in the field and a questionnaire among farmers.

Results and Discussion: as of 2014, from all of the assessments of agricultural surpluses throughout this report, the amount of edible agricultural surplus comes out to about 200,000 tons per year. Only 10,000 tons of fresh fruits and vegetables are saved. Those 200,000 tons of fruits and vegetables are destroyed by farmers, or left in the fields for different economic reasons - often with the informal consent of the Plants Council (a public council with representatives of farmers, government and the public), in an attempt to create a balance in the market between supply and demand. The most significant reasons for surplus agricultural produce creation in the pre/post-harvest stage are: high price markups between the price the farmer receives and the price paid by the consumer; high crop standards due to our society's overextended requirements for perfect/high quality produce (such as size and appearance) lead to crop sorting/selective harvesting; and overproduction due to incorrect or lack of planning.

Until 2004 the Israeli government financed the surplus removal plan which allowed the government to achieve a balance in the local market for products that are supported by regulated prices (OECD, 2010). The Plant Council intervenes to prevent situations, in which the surplus produced would enter the market, impair the minimum price and reduce profitability of the agricultural production. The Plant Council, cleared surpluses by redirecting them to exports, selling to industry at a loss, or destroying them. After government funding for the plan stopped in 2004, the Plant Council stopped all of its surplus removal activities and it was no longer part of their official duties. Today, vegetable and fruit agricultural surpluses are usually handled by farmers themselves (Knesset Research and Information Center, 2009). In Israel, since 2005 agricultural input prices have been rising more rapidly than agricultural output prices. Consequently when output costs do not cover the simultaneous rise in cost of inputs, it is financially unfeasible for the farmer to harvest the produce. Not only are farmers left without income, fruits and vegetables are abandoned in the fields and orchards, totalling to thousands of tons annually. In addition with a highly concentrated food retail market in Israel, the power is in the hands of the retail chains, which determine the quality measures, price and terms of marketing, forcing occasionally the farmer to leave the produce in the field causing surplus. From 2005 to 2011 fruit prices in Israel rose at a real rate of 44.1% and vegetable prices by a real rate of 23.8%, considerably affecting the disadvantaged population. Surplus crops could be transferred to non-profit food organizations and given to this needy population. However, the Plant Council is reluctant to release the surplus

crops, claiming that the fruits and vegetables will indirectly enter the market and fear a decline in wholesale prices. Our claim is that the quantity of produce that food rescue organizations can save cannot affect market prices. The needy population cannot and will not go and buy the fruits and vegetables alone so the market is not affected.

Questionnaire: Analysis of the survey that was conducted among 30 farmers revealed that farmers do not consider surplus agricultural produce a serious issue. Even though 86% of the participants declare they are environmentally aware, only 20% consider the environmental impact of agricultural surplus to be severe. Moreover, farmers' low environmental awareness decreases their intent to donate, with only 17% of the participants inclined to donate in an attempt to reduce the environmental issues of surplus. Additionally, the survey revealed that among farmers there is a lack of awareness regarding donation of agricultural surplus as well as to the benefits of surplus donation, and to the role played by food aid associations, the crucial void they fill and the waste they prevent.

Conclusion: Agricultural surpluses are by definition, a lose-lose issue. On the one hand, there is a need for resources to produce them (land, water, fertilizers, labour, etc.) and on the other hand, to dispose of these surpluses imposes an environmental burden. In order to minimize the loss of food and production of waste, there is a need to develop clear policies, both in order to reduce agricultural surplus and limit produce destruction as well as optimal utilization of the surplus if formed. Our study proposes that if agricultural surpluses are created, hence to reduce loss and waste production, these surplus fruits and vegetables should be transferred to the needy. Creating a food bank and food rescue network, can alleviate the problem of nutritional insecurity among Israel's diverse population. Therefore, national projects to pick and collect the un-harvested agricultural surplus left on the field, store it, and supply to the needy population will not only minimize environmental burdens, it will also supply food security. Current figures for Israel show 10,000 tons of fresh fruits and vegetables saved, a very low figure compared to surpluses produced. Our study suggests to increase awareness of farmers of the social importance of saving/donating surpluses, increase awareness of farmers of the existence of non-profit food organizations by encouraging the link between the suppliers (the farmers) and the demand (charity organizations). However, the farmers should not be the ones to bear the market failure, and therefore we suggest creating a mechanism that will increase farmers' profitability by voluntarily reporting of surplus quantities (throughout the food chain). Real-time reporting mechanism should assist both the farmer and the needy, while the government supervises the flow of information.

Recommendations: In light of policies, actions, and the situation in Israel, our recommendations are divided into two closely related areas: 1) Source reduction - reduce/prevent surplus creation in the first place: planning crop types and quantities by farmers; required restriction on the price mark up between farmers and retail chains; aligning the quality measures/standards of fruits and vegetables from a government level, without difference in quality for local production and exports – a standards law. These quality measures should be known from the farmer to the consumer that way the retail chains can't set their own standards. 2) Better management of surpluses if created: specifically donations to the needy; increase awareness of farmers of the social importance of saving/donating surpluses; increase awareness of farmers to the profitability of voluntarily reporting of surplus quantities, throughout the food chain (reporting can be similar to the [voluntary national greenhouse gas \(GHG\) registry](#)); establish a mechanism by which farmers can report surplus in real time; remove barriers to food donations by all relevant government bodies; increase awareness of farmers of the existence of food aid associations and encourage the link between them (using agricultural instructors); enforcement of the 1973 Plant Council Law (production and marketing), section 60 - requiring to exhaust all possibilities especially donation to the needy before deciding on surplus destruction. Finally, it should be noted that this study did not check which policy measures are the most effective or their implementations, therefore further studies are required.

References

- Central Bureau of Statistics (CBS) (2014). Statistical Abstract of Israel 2012 #19.23, Food Supply Balance Sheet.
- Food and Agriculture Organization of the UN (FAO) (2009). How to Feed the World in 2050. Rome: FAO: http://www.fao.org/fileadmin/templates/wsfs/docs/expert_paper/How_to_Feed_the_World_in_2050.pdf
- Food and Agriculture Organization of the UN (FAO) (2011). The State of the World's Land and Water Resources for Food and Agriculture – managing systems at risk. Rome: FAO.
- Godfray, H., Crute, I., Haddad, L., Lawrence, D., Muir, J., Nisbett, N., ... Whiteley, R. (2010). The future of the global food system. *Philosophical Transactions - Royal Society. Biological Sciences*, 365(1554), 2769-2777.
- Hall, K.D., Guo, J., Dore, M., & Chow, C.C (2009). The Progressive Increase of Food Waste in America and its Environmental Impact. *PLoS ONE*.4. 6.
- Hodges, R.J., Buzby, J.C., & Bennett, B. (2011). Postharvest losses and waste in developed and less developed countries: Opportunities to improve resource use. *Journal of Agricultural Science*, 149(S1), 37-45.
- Knesset Research and Info. Center (2009). Dealing with surplus agricultural produce. by: Gilad Nathan (in Hebrew)
- Kummu, M., de Moel, H., Porkka, M., (2012). Lost food, wasted resources: Global food supply chain losses and their impacts on freshwater, cropland, and fertilizer use. *Science of the Total Environment*, 438, 477-489.
- OECD (2010) Review of Agricultural Policies: Israel 2010.
- Schneider, F. (2008). Wasting Food—an insistent behavior. *Proceedings Waste—The Social Context*, 8.