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22
Notes

A Short Scientific Note on the Horticultural Crops Optimum Planting Dates in Jordan

M.A. Massimi and A. I. Al-Bdour
Zarqa Extension Department, Zarqa Agricultural Directorate, Jordan's Ministry of Agriculture Postal Code: 13110, P.O.Box: 1433, Zarqa, Jordan

According to statistics of the Statistics Department for 2016 in Jordan government, the total area of vegetables in Jordan accounted to about 50579 hectares including open and protected crop, where most of the crops include tomatoes, squash, eggplant, cucumbers, potatoes, cabbage, cauliflower, pepper, and faba-beans. The smallest areas were Snake cucumbers, turnips, carrots, parsley, and radish. Due to the climate change conditions and the changing needs of local and global agricultural markets, it has become necessary to provide farmers and rural women with the optimal time to grow crops.However, plant biologists classify crops by family or by the portion consumed from the crop, making it difficult for agricultural extension agents in the field and academic scholars to classify crop planting dates.The problem becomes even more complicated when agricultural experts, plant physiologists, and crop ecologists engaged in this, where classifications are intertwined and it becomes difficult to find out when to grow crops. However, this issue can be simplified in many ways. In terms of the experience of local farmers and inherited information from their parents, it is easy to set the dates of winter and summer agriculture without addressing the autumn and spring crops so as not to increase complications due to climate change. Especially that global warming caused the disappearance of the features of the autumn and spring seasons with the expansion of time and overlap for the rest of the seasons of both winter and summer.However, it is very important to mention another very important reason and is a major cause of this huge and significant discrepancy in information, it provides protected crops that produce crops at any time and provide them throughout the year. The entry of Arab countries (such as Jordan and Egypt) into the international markets and free trade agreements makes these countries a market for crop consumption and availability at any time among the year.

This scientific note aims at simplifying the classification of planting dates for the common horticultural crops in Jordan according to winter season crops and summer season crops.Table 1 classifies open horticultural crops in Jordan categorized ecologically (winter and summer crops) and physiologically (cool and warm season crops).

Keywords: Planting dates, Horticulture, Vegetables.

Corresponding author: e-mail: mohunnad.massimi@moa.gov.jo
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Table 1. Botanical, ecological and physiological classification of horticultural and olericultural crops grown in Jordan as open cultivated vegetable crops

No.	Crop	Scientific Name	Winter Season Crop	Summer Season Crop	Cool -Warm Season Crop
1	Armenian (Snake) Cucumber	*Cucumis melo* var. *flexuosus*.	-	+	W
2	Arugula (Rocket)	*Eruca sativa* Mill.	+	-	C
3	Bean †	*Phaseolus vulgaris* L.	-	+	W
4	Broccoli	*Brassica oleracea* var. *italica*	+	-	C
5	Cabbage	*Brassica oleracea* var. *capitata* f. *alba*.	+	-	C
6	Carrot	*Daucus carota* L.	+	-	C
7	Cauliflower	*Brassica oleracea* var. *cauliflora* L.	+	-	C
8	Coriander	*Coriandrum sativum* L.	+	-	C
9	Cowpea †	*Vigna sinensis* savi.	-	+	W
10	Cucumber	*Cucumis sativus* L.	-	+	W
11	Eggplant	*Solanum melongena* L.	-	+	W
12	Faba-bean †	*Vicia faba* L. (*faba vulgaris*) Moench.	+	-	C
13	Fennel	*Foeniculum vulgare* L.	+	-	C
14	Garden Cress	*Lepidium sativum* L.	+	-	C
15	Garlic	*Allium sativum* L.	+	-	C
16	Jute or Jew's Mallow	*Corchorus olitorius* L.	-	+	W
17	Lettuce	*Lactuca sativa* L.	+	-	C
18	Melon (Musk Melon)	*Cucumis melo* L.	-	+	W
19	Mint	*Mentha spicata* L.	+	-	C
20	Okra	*Hibiscus esculentus* L.	-	+	W
21	Onion	*Allium cepa* L.	+	-	C
22	Parsley	*Petroselinum hortens*. Hoffmann.	+	-	C
23	Pea †	*Pisum sativum* L.	+	-	C
24	Pepper	*Capsicum annum* L.	-	+	W
25	Potato	*Solanum tuberosum* L.	+	-	C
26	Pumpkin	*Cucurbita pepo* var. *pepo* L.	-	+	W
27	Radish	*Raphanus sativus* L.	+	-	C
28	Spinach	*Spinacia oleracea* L.	+	-	C
29	Spinach Beet	*Beta vulgaris* var. *cicla* L.	+	-	C
30	Squash	*Cucurbita pepo* L.	-	+	W
31	Sugar beet	*Beta vulgaris* L.	+	-	C
32	Sweet (Veg ‡) Corn	*Zea mays* var. *sacharata* L.	-	+	W
33	Sweet Pepper	*Capsicum annum* L.	-	+	W
34	Sweet Potato	*Ipomoea batatus* L. Lam.	-	+	W
35	Tomato	*Lycopersicum esculentum* Mill.	-	+	W
36	Turnip	*Brassica rapa* L.	+	-	C
37	Water Melon	*Citrullus vulgaris* schard.	-	+	W

+: Shows that the crop falls within this box, -: Shows that the crop is not within this box.
W: Warm Season Crop, C: Cool Season Crop.
†: Grown for green pods.
‡: Veg: Vegetable.

The optimum planting dates vary by region in Jordan and vary from very early to late, depending on the temperature and classification of the crop and its thermal needs and depending on the market and the extent of demand in conjunction with the intensity of production. In short, the optimum planting dates for open horticultural crops vary from the Jordan Valley to the Semi-Ghor and the Jordanian desert areas (Badia region).

Table 1 shows that the morphological and botanical description of the plant helps in classification. Winter crops are usually leafy vegetative plants or have roots (heads, roots or tubers) that grow under the soil. Both are related to the crop's need for nitrogen and phosphorus to improve production respectively and prevent cold and frost hazards. On the other hand, summer crops are crops grown for fruits that are exposed during the growing season for direct weather conditions. These crops need vegetative and root growth at a specific growth stage, but the final crop must be fruit or green pods. Food legumes differ from the last rule, some fall within winter crops and the others are in summer crops. Winter and summer legumes grown for drying grain may be considered field agronomic crops, not horticultural crops. There is no way here to talk about the potassium element and its fertilization in Jordan because Jordanian soils are rich in this element.

All types of vegetables need water for growth and production, so it is not reasonable to address the classification of horticultural and olericultural crops according to their water needs, especially that there are winter crops depended on rainwater.

Cool season crops grow best at temperatures averaging 15°C cooler than those needed by warm-season types. Many have edible leaves or roots for best results, the grower needs to grow them to maturity in cool weather; otherwise, they can turn bitter tasting, or bolt to seed rather than producing edible parts. (Except in coldest climates, plant them in very early spring (i.e. late winter)) so the crop will mature before summer heat settles in, or in late summer for a crop in autumn in winter. In warm regions, plant cool season crops from late summer to early autumn for harvest in late autumn, winter, or early spring. However, warm season crops require both warm soil and high temperatures (with a little cooling at night) to grow steadily and produce crops. They include traditional summer crops, for almost all of these vegetables, the fruit (rather than the roots or leaves), is the edible part. Warm-season crops are killed by winter frosts, so it must not be planted until after the last frost in spring unless it has given cold protection.

It is necessary to schedule vegetable crops by season to organize and model crop rotations. Crop rotations are long-term plans that improve sustainability and profitability (Sexton, 2018). Many studies have found similar results and emphasized the importance of crop rotations within agricultural development plans. Similar findings were reported for forage agronomic crops in Jordan using treated wastewater (Massimi et al., 2018). Agricultural crop rotations are environmentally safe methods to control pests and procedures for obtaining a healthy food product. The Jordanian Ministry of Agriculture is now directing the issuance of the Jordanian Good Agricultural Practices (Jordan GAP) regulations along the lines of the global good agricultural practices (Global GAP), where the crop rotations programs are used to meet the requirements for obtaining these certificates.

Conclusion

In the summary, it is very important to determine the optimal planting dates for all types of horticultural crops and to distinguish the winter and summer open crops to determine the agricultural patterns of each region, in order to ensure that the local product has a preferential price throughout the year to prevent flooding the local market with imported crop products, and to address the risk of various agricultural pests, insects and weeds as well as to maintain soil fertility and water retention from the principle of management of inputs and the costs of agricultural inputs, especially with regard to irrigation costs, water costs, and fertilizers costs. This study recommends the development of a database and computerized programs for the design of crop rotations by introducing basic scientific data such as plant physiology and plant ecology in line with the policy of production, import and export strategies.

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ملاحظة علمية قصيرة حول المواعيد المثالية لزراعة المحاصيل البستانية في الأردن

مهند عبد الكريم مسيمي وعلاء الدين إبراهيم البدور
قسم الإرشاد الزراعي - مديرية زراعة الزرقاء - وزارة الزراعة الأردنية - الرمز البريدي ١٣١١٠ - ص ب: ١٤٣٣ - الزرقاء - الأردن.

حسب إحصائيات دائرة الإحصاءات العامة لعام ٢٠١٦ في الأردن، بلغت المساحة الإجمالية للخضار في الأردن حوالي ٥٠٥٧٩ هكتار بما في ذلك المحاصيل المكشوفة والمحمية، حيث تشمل معظم المساحات محاصيل البندورة والكوسا والباذنجان والخيار والبطاطا والملفوف والزهرة والفلفل والفول أما المساحات الأصغر فهي تشمل الفقوس واللفت والجزر والبقدونس والفجل. بسبب ظروف تغير المناخ والاحتياجات المتغيرة للأسواق الزراعية المحلية والعالمية، أصبح من الضروري تزويد المزارعين والنساء الريفيات بالوقت الأمثل لزراعة المحاصيل. ومع ذلك، يقوم علماء الأحياء النباتية بتصنيف المحاصيل حسب العائلة النباتية أو الجزء المستهلك من المحصول، مما يجعل من الصعب على مهندسي الإرشاد الزراعي في المزارع والباحثين الأكاديميين تصنيف مواعيد زراعة المحاصيل. من المهم جدا تحديد تواريخ الزراعة المثلى لجميع أنواع المحاصيل البستانية وتمييز المحاصيل المكشوفة في الشتاء والصيف لتحديد الأنماط الزراعية لكل منطقة، وذلك لضمان أن يكون للمنتج المحلي سعر تفضيلي على مدار السنة ومنع إغراق السوق المحلية بالمنتجات الزراعية المستوردة، ومعالجة مخاطر مختلف الآفات والأمراض الزراعية والأعشاب الضارة، وكذلك للحفاظ على خصوبة التربة والاحتفاظ بالمياه من مبدأ إدارة المدخلات وتكاليف المدخلات الزراعية، وخاصة فيما يتعلق بتكاليف أنظمة الري وتكاليف المياه وتكاليف الأسمدة. توصي هذه الدراسة بوضع قاعدة بيانات وبرامج محوسبة لتصميم دورات المحاصيل بإدخال البيانات العلمية الأساسية مثل علم وظائف أعضاء النبات وبيئة النبات بما يتماشى مع سياسة الإنتاج واستراتيجيات الاستيراد والتصدير.