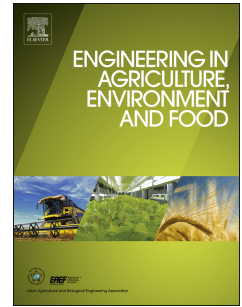


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1 Harvesting technologies for Chinese jujube fruits: A review

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6 Abstract:

7 In this article, a review of the mechanisms that have been developed to improve the efficiency of
8 Chinese jujube (*Ziziphus Jujuba* Mill) was made. This fruit is considered as an economic crop in
9 the arid and semiarid regions especially in China, where the cultivation methods alternate between
10 traditional and intensive. In the former the trees are large and planted with relatively wide space,
11 whereas in the latter the trees are dwarfed with tight spacing among them. Mechanisms which
12 were studied and tested, for each cultivation method, were summarized and compared in terms of
13 fruit collecting efficiency and rate of damage. These mechanisms were branch beating, trunk
14 shaking, air shaking for traditional cultivation and tree shaking, canopy shaking, and vacuum
15 suction for intensive cultivation. The comparison indicated that as the efficiency increase for any
16 single mechanism the rate of damage increases accordingly. Therefore, a combination of
17 mechanism would maintain the efficiency and reduce damage. In particular, a combination of a
18 mechanism of tree shaking, developed earlier for blueberry, and trunk shaking was thought to be
19 with high potential of low rate of damage. This article also spots on the possibilities of fully
20 automating the post-harvest operation of fruit grading by describing a number of previous articles
21 that have tackled fruit sorting not only for fruit processing but also for fresh market. The hope is
22 that this review will spark the renewal of research and development of the cultivation of Chinese
23 jujube so as to meet the increasing demand.

24 Keywords: Chinese jujube; Fruit; Harvesting; Mechanization; Grading

25 1. Introduction

26 Chinese jujube (*Ziziphus Jujuba* Mill) is a deciduous fruit tree that ripens its fruit in autumn. It is
27 grown in the temperate and subtropical areas of the Northern Hemisphere, especially the drier
28 parts of north China [1]. As it is a plant well adapted to the climate in this region, lasts for long
29 time, and fits in long-term intercropping systems; Chinese jujube has become more popular in
30 different parts of China, especially in the dry northern parts [2]. It is considered to be an ideal
31 economic crop for arid and semiarid areas where common fruit trees do not grow well [3].
32 Accordingly, the International Centre for Underutilized Crops in Southampton, U.K., identified
33 Chinese jujube as a crop with substantial growth potential in 2006 [4]. Recently, its cultivation has
34 witnessed an increase in other regions in the world such as the southwest Europe, the Middle East,
35 and India [5].

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