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# The Effect of Cadmium Toxicity on Changes of Proline and Antioxidant in Lettuce

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## Abstract

Information of heavy metal toxicity about physiological aspect of lettuce is limited. Therefore an experiment was conducted in CRD designed with 7 replications on lettuce (*Lactuca sativa* L.). Treatments were cadmium in 3 concentration (0, 2 and 4 mg/L) added to Hoagland solution. Results were shown that increasing in cadmium of nutrient solution caused increasing in SOD, POD antioxidant and proline contents of leaf tissues, in addition, cadmium decreased the amount of fresh weight and organic acid. Applying 2 and 4 mg/L cadmium in nutrient solution produced POD, SOD and Proline around 8 and 53%, 55 and 106%, 39 and 119% in 2 and 4 mg/L cadmium, respectively. Whereas in the same concentrations of cadmium protein decreased 25 and 5 %, respectively. Under cadmium stress, toxic effects decline photosynthesis more than chlorophyll content.

**Keywords:** Proline, Protein, Cadmium, Lettuce, Antioxidant

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# Nano Packaging and Edible Coating Used for Improvement of Shelf Life and Quality of Individual Fresh Pistachio Nuts

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## Abstract

Fresh pistachio nuts undergo biochemical and physiological changes after harvest and postharvest and as a result, it has a short shelf life. The purpose of this research is to study the effects of packaging type and edible coating on quality and increasing the shelf life of fresh pistachio nut. Therefore, two separate experiment were conducted and in first one the individual fresh pistachio were dipped in different concentration of aloe vera gel (0 (control), 25, 33, 50 %) and also Nanocid at 80 and 100 $mgl^{-1}$ and kept at 4±2°C for 40 days. In second experiment, to compare the plastics produced through Nano technology and usual plastics (nylon), fresh pistachio nut were packed and stored in mentioned condition. Weight loss, pistachio quality appearance and its marketability were examined every 5 day- interval and fat and soluble carbohydrate at the end of storage. The results showed that Nano films comparing to control were useful significantly ($p \leq 0.01$) in controlling the weight loss and keeping fresh pistachio's appearance. Also weight loss and fresh pistachio browning were lower in aloe vera gel treatments and the best results (higher soluble carbohydrate and appearance) come from 25% aloe gel compared to control.

**Keywords:** *Aloe vera* gel, Browning, Shelf life, Lipid

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# The Effects of Cultural Medium and Cultivars on Some Agronomic and Physiological Characteristic of Melon′s Transplant

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## Abstract

Melon produced by transplanting cause seed saving, reduce the risk of cold, pest and disease stress. In order to investigate the effects of growing medium and cultivars on characteristic of melon's transplants, an experiment was conducted based on randomized completely design with 10 replications at the Ferdowsi University of Mashhad during 2010. Treatments included 6 levels of growing medium (a1= 50% peat+25 % coco peat+ 25 % sand, a2= 50% peat+25 % coco peat+ 25 %+ 25% vermin compost, a3= 50% peat+25 % coco peat+ 25 % perlit, a4= 50% coco peat+ 25% peat+25% sand, a5= 50% coco peat+ 25% peat+25%vercompost, a6= 50% coco peat+ 25% peat+25% perlit) and 2 types of cultivars: Eyvanakey and Khatooni. The results indicated that the effects of substrate were significant in all of treats (leaf area, stem diameter, height of transplant, root dry weight, shoot dry weight, root wet weight, and shoot wet weight). 2 (50% peat+25 % coco peat+ 25 %+ 25% vermin compost) and a5 (50% coco peat+ 25% peat+25%vercompost) have better performance than others in all of treats. There is not any significant effect between cultivars and interaction between substrate and cultivars wasn't significant.

**Keywords**: Melon, Growing medium, Cultivar, Transplant

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# Effect of Vermicompost on Germination and Seedling Growth of Tomato (*Lycopersicum esculentom* L.) Varieties, Mobil and Superorbina

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Accepted: 10- 09- 2013

## Abstract

Two separate experiments were carried out with the aim of investigating the effect of vermicompost and its aqueous extracts on traits related to germination and growth of tomato varieties, (Mobil and Superorbina). In the first experiment, 0.5, 1, 1.5, 2, 2.5, 5, 7.5, 10 and 100% extracts of vermicompost (V - V) along with control (distilled water) were studied on germination of two varieties of tomato. The number of germinated seeds was counted each day and was sampled after a week. Then, the percentage and rate of germination and length and dry weight of shoot and root were determined. In the second experiment, volume ratios of vermicompost to sand, including to, 0:100; 10:90; 20:80; 40:60; 60:40; 80:20 and 100: 0, on tomato varieties seedling growth were investigated. The seeds were planted in plastic pots and the sampling of seedlings was carried out 22 days after planting. Both experiments were conducted in Completely Random Design with four replications. The results showed that vermicompost extract could not improve the growth of Mobil and Superorbina varieties, whereas application of vermicompost, had a significant effect on plant height, area and dry weight of leaves, stem dry weight, area, diameter and dry weight of roots and the concentration of potassium, calcium and phosphorus in tomato leaves. These results confirm that using low ratios of vermicompost, have more effect on the growth of tomato seedlings rather than high ratios, so that the maximum effect of vermicompost were recorded in the ratios of 20 and 40 % for Mobil and Superorbina varieties, respectively. In this experiment, high vermicompost ratios had a negative effect on growth of tomato seedlings.

**Keywords:** Germination, *Lycopersicum esculentom* L., Seedling growth, Vermicompost

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# Improving Germination of Guava (*Psidium guajava*) Seeds by Acid Scarification

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Accepted: 27- 08- 2013

## Abstract

As seed germination of Guava **(***Psidium guajava***)** is poor and time-consuming, the effects of seed extraction technique and scarification methods on the seed germination and seedling growth of Guava cv. Allahabad safeda, were investigated. First experiment was conducted on extraction of Guava seeds using sulfuric acid ($H_2SO_4$) : seed ratios including: 1:5, 2:5 and 3:5) or manual extraction (control) methods to investigate the effect of these methods on seed germination. The best extraction method was soaking in $H_2SO_4$ ($H_2SO_4$): seed ratio 1:5); these seeds exhibited the highest germination (70%) and root dry weight (340 mg). In second experiment, seed scarification using sulfuric acid ($H_2SO_4$ ) was compared with scarification using hydrochloric acid (HCl). Results showed that seed germination and root growth of seedlings were increased by scarification using HCl for 10 or 15 minutes. It seems that delaying seed germination of guava (*Psidium guajava*) is mainly related to seed coat hardiness and physical dormancy.

**Keywords**: Acid, Seed germination, Scarification, Guava **(***Psidium guajava***)**

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# Effect of the Amount and Time of Partitioning of Nitrogen Fertilizer on the Yield and Nitrate Content of Onion in Out-Season Production in Jiroft

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## Abstract

Production of onion all thruough the year particularly in semi tropical regions has been considered as an alternative to fulfil the local markets needs. In order to determine the best amount and method of urea fertilizer application so that to have higher yeild and lower amount of nitrate content the effects of seven levels of urea fertilizer including 0, 90, 180, 270, 360, 450 and 540 kg of nitrogen per ha and three different partitioning method of fertilizer application including application at 2, 3 and 4 times of each of the above mentioned amounts of fertilizers during the growing period were examined in a factorial experiment based on randomized complete block design with three replications in Jiroft. Results showed that increasing the amount of nitrogen fertilizer increased leaf length and crown diameter but decreased dry matter. The amount of fertilizer also showed significant effect on diameter and length. The highest bulb dry meter and length and yield were obtianed by application of 270 kg/ha of nitrogen while using higher amounts caused them to decrease. Nitrate content of the bulbs was strongly affected by the amount of nitrogen fertilizer applied so that the highest value (126.8 mg/kg/ fresh weight) was obtianed under highest level of nitrogen fertilizer. Nitrate content and bulb dry matter were also affected by the number of times of fertilizer application. Results of this study suggesting that to obtain high yield and low nitrate content, more than 180 kg of nitrogen per ha should not be applied.

**Keywords**: Onion, Nitrate, Fertilizer partitioning, Urea, Out of season production

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# The Study on the Effect of Spraying with Different Concentrations of Vermicompost Extract (Vermiwash) on the Morphological Traits, Yield and Percentage of Essential oil of Lemon balm (*Melissa officinalis* L.)

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Received: 29- 05- 2011
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## Abstract

To investigate the effect of spraying with different concentrations of Vermiwash solution on the morphological traits, percentage and yield of essential oil of lemon balm (*Melissa officinalis* L.), this experiment was conducted as Randomized Complete Block Design (RCBD) with four replications in experimental field of Agricultural Faculty of Ferdowsi University of Mashhad (FUM). The treatments were included 4 different concentrations of Vermiwash solution (0, 3000. 6000 and 12000 ppm). At the flowering stage, morphological characteristics include of plant height, number of nod and internodes length, as well as total fresh weight, leaf area, dry weight of plant, yield and percentage of essential oil were determined. Results showed that there was a significant difference between different treatments in terms of plant height, number of node, internodes length, leaf area, and dry weight of plant and essential oil yield. The highest height (84.91 cm), number of node (23.20), leaf area (8853.52 $cm^2$) and plant dry weight (174.31 g) related to vermiwash concentration of 3000 ppm and the longest internodes (7.02 cm) and essential oil yield (6 $g/m^2$) related to concentration of 1200 ppm. In conclusion, application of 3000 ppm vermiwash was the superior among the all studied treatments that confirmed activity of plant growth regulators in low concentration of vermiwash and availability of nutrient in the solution.

**Keywords:** Lemon balm, Biological manures, Medicinal plants, Active substances

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# Effect of Pre-heat Treatment and Herbal Essences on the Postharvest Properties of Blood Orange

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Received: 26- 10- 2011
Accepted: 14- 07- 2013

## Abstract

Postharvest losses are a limiting factor on storage life of many vegetables and fruits including citrus. Therefore a study was conducted to evaluate the effects of thermal treatments and herbal thyme oil spray on Sanguinello blood oranges in Golestan province in the northern part of Iran. The tests have been performed one day after harvesting, under four different treatments: hot water at 55˚C for 3 minutes, flushing of steam at 100˚C for 30 seconds, and spraying of fruits with two-percent thyme using surfactant. The fruits of each treatment were then kept in some boxes and placed in a cold storage at 8˚C and relative humidity of 85±5 percent, for two months. Results showed that the treatments had no significant effect on the quality parameters of fruits such as acidity, total soluble solid, maturity index and sensory evaluation. However, among all treatments, the steaming treatment had the greatest impact in preventing weight loss during storage.

**Keywords**: Postharvest, Storage, Blood orange, Heat treatment, Herbal essences

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شاپا: ۴۷۳۰ - ۲۰۰۸

# Effect of Gibberellic Acid and Scarification on Seed Germination in Four Almond Species

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## Abstract

Almonds belong to *Prunus* genus, which is related to Rosaceae family. It has close relatives with different species of stoned fruits. One of the main reasons for the long period of seed germination in *Prunus* is compound dormancy, such as the external seed cover as physical dormancy and embryo dormancy causes physiological dormancy. Seed stratification and treatments with various hormones are used to eliminate the physiological dormancy in *Prunus* genus seeds. Ancillary methods such as removing the shell and scarification are used in order to eliminate physical dormancy. This research was carried out in order to study the effect of scarification (scarification or lack of scarification) and gibberellic acid (0, 150, 300 and 450 mg/lit) on percent and rate of germination in four species of almond (Three wild species; *Prunus elaeagnifolia*, *P. scoparia* and *P. lycioides* and one domestic species; *P. dulcis*) in factorial design based on completely randomized design with three replications. Removing the shell caused a significant increase in the percentage and rate of germination in all species. In general, treatment of seeds with 300 mg/lit gibberellic acid increased percentage and rate of germination than control significantly, but according to depth of seed dormancy, the response of the species to the concentrations of gibberellic acid was different. According to the results, the seed germination amount is different in different genotype.

**Keywords:** Almond, Gibberellic acid, Scarification, Stratification, Germination

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# The Study of Extract Biochemical Variations Content Some of Spearmint (*Mentha spicata* L.) Population

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Received: 25- 12- 2012
Accepted: 22- 09- 2013

## Abstract

A pot experiment was conducted to evaluate the extract biochemical variations among 25 spearmint population. The experiment was a randomized complete design (RCD) with 25 treatments (population) and three replications. For this purpose, three rhizomes with 5 cm length were selected and planted in each pot. All pots were kept out side. The plant samples of all treatments were harvested at full flowering stage and the most important extract biochemical factors such as chlorophyll a, b and total, carotenoide, flavone and flavonol, total flavonoide, total phenolic compound, antioxidant activity, and carbohydrate content were measured. Moreover, all characteristics of studied population were subjected to cluster analysis and correlation between factors was determined. There were significant differences among population in all studied factors. The highest and lowest chlorophyll contents (35.77 and 10.5 mg/g FW) were obtained in Fars- Khafr 2 and Mazandaran-Nour population, respectively. Among studied population, Isfahan 2, Mazandaran-Qaemshahr, Mazandaran-Nour and Yasouj were superior in extract biochemical valuable properties like antioxidant activity, total phenolic compounds, total flavonoides, and total carbohydrates. Also, some population of Fars province constituted more carotenoide and chlorophyll contents and were superior to others. Furthermore, a positive correlation was detected between antioxidant activity, phenolic compound, and total flavonoides.

**Keywords:** *Mentha spicata*, Antioxidant activity, Phenolic compound, Carbohydrate, Correlation

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# Effects of Calcium Chloride, Gibberellin and Benzyladenine on Qualitative and Quantitative Characteristics and Flower Longevity of Zinnia (*Zinnia elegans* J.)

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## Abstract

The Zinnia (*Zinnia elegans* J.) flower has many applications in landscape design, whereas lack of adequate conditions and nutritions in some cases can reduce the quality and number of flowers. Therefore, control of growth conditions is very important related to nutrition and application of growth regulators to improve the quality and quantity of flowers. Flower's morphology and longevity are two main factors that are used to evaluate the quality of flowers. Application methods that could increase the vase life, is important. A research conducted to investigate the effects of calcium chloride, gibberellin and Benzyladenin on zinnia quantitative and qualitative characteristics in 2010. Experiment carried out in a factorial in randomized complete block design with four replications at the Sharekord University's research farm. Treatments consisted calcium chloride (0, 0.5 and 1 gram per liter), Gibberellin (0, 75 and 150 mg per liter) and benzyladenine (0, 75 and 150 mg per liter) to be sprayed on plant two times in 10 days interval. The result showed that calcium chloride increased stem diameter, number of lateral shoots and flowers and storage vase life. Gibberellin reduced flower and stem diameter, number of axillary shoots and flower. Gibberellins also reduced the beginning of flowering time from transplanting and increased the vase life of the flower on plant and storage. Furthermore, benzyladenine significantly increased the quality and quantity of plant except the flowering period.

**Keywords**: Zinnia, Calcium chloride, Gibberellin, Benzyladenine, Flower longevity

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# The Effect of Different Levels of Nitrogen and Copper on Yield and Nutrients Concentrations and Nitrate Broccoli Head (*Brassica oleracea*)

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Accepted: 27- 08- 2013

## Abstract

In order to study the effect of different levels of nitrogen and copper on yield and nutrients concentrations and nitrate in broccoli head, an experiment was conducted based on a factorial combinations of five levels of nitrogen (0, 100, 200, 300 and 400 kg/ha) and three levels of copper (0, 2.5 and 5 kg/ha) that were applied to soil as ammonium sulfate and copper sulfate respectively, in three replications in greenhouse of Zanjan University in 2010. Results showed that application of nitrogen and copper increased head yield and quality of broccoli. The application of 300 kg N + 2.5 kg Cu/ha resulted in highest yield of broccoli head. The highest concentration of nitrogen in broccoli head was measured in treatment with 400 kg N+ 2.5 kg Cu/ha. The highest concentration of nitrate in broccoli head was measured in treatment with 300 kg N/ha and without use of copper. Also, application of higher amount of copper decreased nitrate concentration in broccoli head. The highest concentrations of potassium and calcium in head were obtained with application 300 kg N + 2.5 kg Cu/ha. The results showed that application of nitrogen and copper in Optimum levels increased head yield and nutrients concentrations in broccoli head.

**Keywords:** Broccoli, Yield, Nutrient, Copper, Nitrogen

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شاپا: ۴۷۳۰ - ۲۰۰۸

# Effect of Cycocel on Growth and Photosynthetic Pigments of Tow Olive Cultivars under Different Irrigation Intervals

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## Abstract

The water deficiency is one of the serious problems in the arid zones. In order to investigate the effect of Cycocel on different growth aspects of two olive cultivars (Mary and Mission), a greenhouse experiment was conducted using three factors of: cycocel at three levels (0, 500 and 1000 mg $L^{-1}$), irrigation of three levels (irrigated at 5, 10 and 15 days intervals) and tow olive cultivars (Mary and Mission) in a factorial experiment based on randomized complete block design of three replicates for the lasted four months. The results showed that both cycocel treatments decreased plant height, increased root length and number of lateral shoots; but no significant difference in stem diameter, leaf numbers, total lengths of lateral shoots, fresh weight of stem and root, chlorophyll b and carotenoid content was observed compared with control. High cycocel level (1000mg$L^{-1}$) increased fresh weight of leaf and chlorophyll a content than the control. Also, results showed that increased periods of drought have reduced the plant height, stem diameter, leaf numbers, number of lateral shoots and total lengths of lateral shoots, root length, fresh weight of leaf, stem and root, increased chlorophyll a+b and carotenoid content in both cultivars. In above-mentioned parameters Mission cultivar showed higher resistance to drought stress than the Mary cultivar. Results suggested that Cycocel treatment can alleviate some negative effects of drought stress in Mary and Mission cultivars of olive.

**Keywords:** Vegetative growth, Fresh weight of plant, Chlorophyll, Carotenoid

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# Effect of Different Growth Media on Nutrients Uptake, Growth Characteristics and Yield of Gerbera (*Gerbera jamesonii*) in a Soil Less Culture System

**M.A. Khalaj[1*]- M. Amiri[2]- M.H. Azimi[3]**

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## Abstract

This experiment was carried out to investigate the effect of different substrate on growth and yield of Gerbera flower. The experiment was performed using 10 treatments as fallow: fine sand, peat +fine sand (%25+%75), peat + fine sand ( %50 +%50), perlite + peat (%75 + %25), perlite + peat (%50 + %50), perlite + peat (%25 + %75), perlite + peat + expanded clay (%25 + %70 + %5), perlite + peat + expanded clay (%50 + %25 + %25), perlite + peat + expanded clay (25%+ %50 + %25), peat + expanded clay (%50 + %50), as a completely randomized design with 3 replications. All treatments irrigated with same nutrient solution. Results showed that planting beds statistically significant differences in morphological characteristics, macro and micro nutrients in plant. Results showed that the media containing perlite + peat + expanded clay (%25 + %70 + %5) is the best of all. In this treatment, flower number, flower disk diameter, shoot diameter, shoot neck diameter, flower height and vase life were 207 ($m^2$/year), 12.4 cm, 0.8 cm, 0.58 cm, 54.5 cm and 11.6 days, respectively.In this treatment, concentration of Nitrogen, Phosphorus and Potassium were 4.17, 0.8 and 4.34 percent, respectively and micronutrients concentration as Iron, Manganese, Zinc, Copper, and Boron on the plant leaves were 155.73, 194.83, 148.56, 44.92 and 51.5 mg $kg^{-1}$ dry weight, respectively.

**Keywords:** Gerbera, Soil less culture, Medium, Peat, Vegetative growth

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# Association Analysis of Some Important Morphological Traits with RAPD Markers in 15 Iranian Date Palm

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## Abstract

This study was performed for assessment of correlation of 11 morphological traits with RAPD molecular markers in 15 cultivars of date palm collected from the South and South West of Iran as population analysis by stepwise regression method. The results of simple and multiple regressions showed that in sum 84 RAPD markers had significant association with at least one of the traits. The coefficient of determination of all informative marker ranged from 32.0 (for stone diameter) to 75.6 (for fruit shape).The highest coefficient belonged to Oligo 215 primer in stone diameter traits (26%) and then Oligo 211 primer in fruit shape trait (24.1) as captain markers. Considerable number of morphological changes was justified by Oligo 42 that polymorphic information was content 0.23. These results showed that with regards to good distribution of random amplification of polymorphic DNA (RAPD) in date genome and the markers with high association with agronomic characters, they can be used in identification of informative markers linked to important agronomic characters.

**Keywords**: Date palm, Morphological traits, RAPD, Informative marker

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# Effects of 1-Methylecyclopropene (1-MCP) and Calcium Chloride ($CaCl_2$) on Increasing Storage Longevity in Mature-Green "Mission" Olives

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## Abstract

The effects of postharvest application of 1-methylcyclopropene (1-MCP) and calcium chloride dip or their combination on storage quality of mature-green olives (*Olea Europaea* cv. mission) were examined. The experiment was conducted using a completely randomized design with three replications, in a factorial array. The effects of treatments were evaluated by recording: chlorophyll (SPAD), quantum efficiency of photosystem II (Fv/Fm), skin color and flesh firmness. Results showed that, non-treated fruits (control) softened within 14 days (2 weeks) after harvest, While, postharvest treatment with 1-MCP significantly reduced the fruit softening and color changes. Furthermore, 1-MCP had only minor effect on quantum efficiency of photosystem II (Fv/Fm). The $CaCl_2$ treatments showed a significant reduction in fruit softening, but had no effects on chlorophyll (SPAD), quantum efficiency of photosystem II (Fv/Fm) and fruit color. It was concluded that the combination of 1-MCP and $CaCl_2$ had synergistic effect on preventing of fruit softening. Hence, olives remained firmness for 35 days at 20$^{o}$C with minimum softening.

**Keywords:** 1-Methylcyclopropene, Calcium chloride, Olive, Storage

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