Agr. Med. Vol. 131, 77-81 (2001)

DORMANCY AND GERMINATION IN *MYRTUS COMMUNIS* L. SEEDS

S. Benvenuti, M. Macchia

Dipartimento di Agronomia e Gestione dell'Agroecosistema, via S. Michele 2, 56124 Pisa, Italy - E-mail: Sbenve@agr.unipi.it

SUMMARY - After harvest *Myrtus communis* seeds are characterized by primary dormancy which only gradually and partly disappears during storage. In our experiments, *Myrtus communis* seeds were consistently found to be photoblastic positive. Application of GA3 or seed washing achieved partial dormancy breaking. When combined, these two techniques produced a synergic effect resulting in roughly 90% germination. Both moist stratification and seed soaking with a water solution of hydrogen peroxide were equally effective. However, only with GA3 was mean germination time reduced, by about 1 day. Seeds whose dormancy was broken (via stratification) showed thermal optima in the 25 to 30°C temperature range. The germination inhibition caused by far red light suggests involvement of phytochrome in *Myrtus communis* germination. Therefore propagation of this species by seed may be achievable through seed treatment. This indicates the potential for agronomic utilization of this species.

Key words: *Myrtus communis, dormancy, germination, light, temperature, plant propagation.*

INTRODUCTION

Myrtus communis L. is a spontaneous species widespread throughout the Mediterranean basin. The name of the botanical genus is derived from the Greek word "myrtos", i.e. perfumed balm, referring to the fragrance released by its leaves when rubbed. This evergreen shrub typically grows as part of Mediterranean maquis vegetation and belongs to the family of *myrtaceae*. Known since ancient times as a traditional phytotherapeutic remedy and even mentioned in the Old Testament, it was traditionally used for its stimulating, astringent and vermifuge properties (Camangi and Tomei, 1999). The oils obtained from myrtle have a complex composition (Shikhiev *et al.*, 1979), endowing this plant with strong antiseptic properties that are particularly useful in the treatment of respiratory disorders, similarly to the more extensively studied species of *Eucalyptus* (Tewari, 1986), which is a member of the same botanical family. The polyphenols obtained from the fruit pericarp are of some pharmacological interest (Martin *et al.*, 1999). Furthermore, in Italy and especially in Sardinia, myrtle is collected from spontaneous shrubs and widely used to distil aromatic liqueurs. Increasing consumption of these liqueurs has prompted the suggestion of germoplasm selection among local populations (Mulas and Cani, 1999).

The growing interest in this possible utilization of myrtle has encouraged research into its reproduction both through vegetal propagation (Klein *et al.*, 2000) and micropropagation (Parra and Amo-Marco, 1998). But available knowledge on seed dormancy is still poor and almost exclusively confined to the effects of temperature during germination (Mitrakos, 1981).

The purpose of the present investigation is to study the dormancy characteristics of this species in order to improve seed germination percentage, which at present constitutes a major drawback. Poor germination has so far prevented this shrub from achieving greater utilization as a medicinal and aromatic species and as an effective ground cover to protect areas subject to erosion and potential hydrogeologic risk.

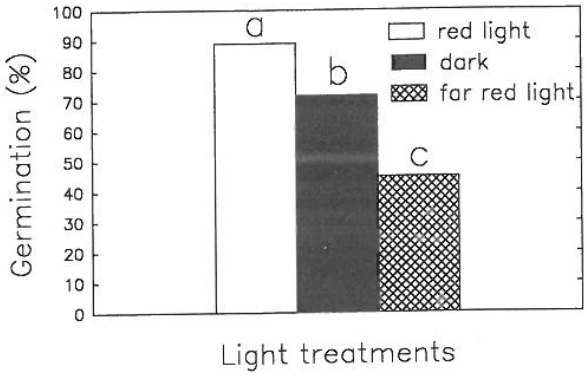

Fig. 2 - Effect of quality light (continuous red, far red or dark) on germination of stratified *Myrtus communis* seeds incubated at the constant temperature of 25°C. Means followed by the same letter do not differ ($p < 0.05$) according to Fisher's protected LSD test.

After dormancy breaking through stratification, the effect of temperature was tested in order to determine seed thermal requirements (Fig. 1). It was observed that below 20°C, germination percentage shrank to 75 and 45% (at 15 and 10°C respectively) in light and to about 45 and 25% (at 15 and 10°C respectively) in darkness. The thermal optimum, giving roughly 90% germination, was reached in the 25 to 30°C range, showing that *Myrtus communis* can be classified as a warm season species. Above this temperature the germination rate decreased. It is important to note that *Myrtus communis* seed consistently showed positive photoblastic reactions at all temperatures tested. To investigate the possible involvement of phytochrome in *Myrtus communis* germination, seeds were exposed to different light qualities: red, far-red or dark. Red light resulted in about 90% germination, as already recorded with white light at the same temperature. In contrast, far red light reduced germination to about 40%, providing evidence of phytochrome involvement in the germination processes of this species. The finding that the germination response with exposure to red light was similar to that obtained with white light could be due to the fact that white light is less effective than red in phytochrome activation (Pr-> Pfr) (Mancinelli, 1986), and consequently the Pfr requirement to trigger germination is fully saturated (Benvenuti and Macchia, 1997).

It can thus be concluded that germination of *Myrtus communis* seeds is linked to the breaking of primary dormancy, which, in its turn, is physiologically linked to the presence of inhibitors in seed coatings. The leaking away and/or oxidation of these substances (NaOCl or stratification) constitutes an even more fundamental basis than GA_3 for seed treatments designed to encourage dormancy breaking. This seed technology can produce satisfactory germination rates for propagation of *Myrtus communis* by seed, suggesting the potential for agronomic utilization of this species as a medicinal and aromatic species.

REFERENCES

BENVENUTI S., MACCHIA M. (1997) - Light environment, phytochrome and germination of *Datura stramonium* L. seeds. Environm. Experim. Bot. 38: 61-71.

BRADCHER C.B., DOLEJ.M., COLE JC. (1993) - Stratification improves seed germination of five native wildflower species. Hort Science 28: 899-901.

CAMANGI F., TOMEI P.E. (1999) - Piante medicinali nella tradizione popolare del Capannorese. Printed by Comune di Capannori (Lucca), Italy, 173 pp.

DON R. (1979) - The use of chemicals, particularly gibberellic acid, for breaking cereal seed dormancy. Seed Sci & Technol 7: 355-367.

FONTAINE O., HUAULT C., PAVIS N., BILLARD J.P. (1994) - Dormancy breakage of Hordeum vulgare seeds: effects of hydrogen peroxide and scarification on glutathione level and glutathione reductase activity. Plant Physiol. Biochem 32: 677-683.

HENDRICKS S.B., TAYLORSON R.B. (1975) - Variation in germination and amino acid leakage of seeds with temperature related to membrane phase change. Plant Physiol. 58: 7-11.

HEIDECKER W., COOLEBEAR P. (1977) - Seed treatments for improved performance – survey and attempt prognosis. Seed Sci. & Technol. 5: 353-425.

HSIAO A.I. (1979) - The effect of sodium hypochlorite and gibberellic acid on seed dormancy and germination of wild oats (*Avena fatua*). Can. J. Boy 57: 1729-1734.

KLEIN J.D. (2000) - Seasonal variation in rooting ability of myrtle (*Myrtus communis* L.) cuttings. Scientia horticulturae 83: 71-76.

LENOIR C., CORBINEAU F., CÔME D. (1986) - Barley (*Hordeum vulgare*) seed dormancy as related to glumella characteristics. Physiol.Plantarum 68: 301-307.

MANCINELLI A.L. (1994) - Some thoughts about the use of predicted values of the state of phytochrome in plant photomorphogenesis research. Plant Cell Environm. 11: 429-439.

MARTIN T., RUBIO B., VILLAESCUSA L., FERNANDEZ L., DIAZ A.M. (1999) - Polyphenolic compounds from pericarps of *Myrtus communis*. Pharmaceutical biology 37: 28-31.

MITRAKOS K. (1981) - Temperature germination responses in three Mediterranean evergreen sclerophylls: *Nerium oleander*, *Myrtus communis* and *Ceratonia siliqua*. Task for vegetation science 4: 277-279.

MULAS M., CANI M.R. (1999) - Germoplasm evaluation of spontaneous myrtle (*Myrtus communis* L.) for cultivar selection and crop development. Journal of herbs, spices & medicinal plants 6: 31-49.

PARRA R., AMO-MARCO J.B. (1998) - Factors affecting in vitro shoot proliferation of *Myrtus communis* L.: a comparison of adult and seedling material. In vitro cellular and developmental biology 34: 104-107.

SHIKHIEV A.S., ABBASSOV R.M., MAMEDOVA Z.A. (1978) - Composition of essential oil of *Myrtus communis*. Chemistry of natural compounds 14: 455-456.

TEWARI R. (1985) - Essential oil from Eucalyptus globulosus Labill: a review. Current research on medicinal and aromatic plants 7: 94-102.

Received: March 2001

Accepted: March 2001