ワイン用新品種‘香大農R-1’の熟枝挿し増殖に対するインドール酪酸（IBA）の影響

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INFLUENCE OF INDOLE 3-BUTYRIC ACID ON HARDWOOD PROPAGATION OF A NEW WINE GRAPE CULTIVAR 'KADAINOU R-1'

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Abstract

To determine effect of indole 3-butyric acid (IBA) on rooting of 'Kadainou R-1' cuttings, hardwood cuttings were treated with 1, 10, 100 and 1000 mg/liter of IBA. Ethanol (50% v/v) and water were used as control. Except at 1mg/liter, IBA improved rooting of 'Kadainou R-1' cuttings in all concentrations used, however, IBA at 100 mg/liter gave the greatest root production rate as indicated by highest rooting percentage, highest primary root number and longest roots.

Key words: 'Kadainou R-1', hardwood propagation, indole 3-butyric acid, rooting.

Introduction

In recent years, global warming is thought to have affected viticulture [1]. Because of the changing physiological responses of plants to changing temperatures and other climatic parameters related to global warming, the quantity and quality of grapes are thought to be severely affected. Hence, an interspecific hybrid grape 'Kadainou R-1' was produced by hybridizing *V. ficifolia* var. *ganebu* (Ryukyuganebu), a wild grape native to a sub-tropical region with low chilling requirements, and a unique European grape, *V. vinifera* 'Muscat of Alexandria,' which produces high quality larger berries that are mostly used for table purposes. 'Kadainou R-1' grape exhibits low chilling trait [2], accumulate high amounts of anthocyanins in its berry skins [3] and produces significant amount of anthocyanins even in high temperature regimes (unpublished data). Hence, 'Kadainou R-1' is one of the promising cultivar which can adopt sub-tropical climatic regions of Japan.

Vegetative propagation is important in horticulture, particularly for mass producing improved materials within a short time and perpetuating the characteristics of the parent plant. The oldest and safest method of propagating grapevines for trueness of variety is through rooting grapevine cuttings [4]. Propagation through cuttings is cheaper and easier than other vegetative propagation techniques such as grafting and *in vitro* techniques. Use of auxins such as indole-3 butyric acid (IBA) has been shown to improve rooting in both difficult-to-root and easy-to-root grapevine species [5, 6, 7]. Auxins are reported to involve the division and elongation of meristematic cells and differentiation of the root primordia, as well as the mobilization of reserve food materials to the site of rooting [8, 9]. 'Kadainou R-1' is a newly released cultivar and the response of IBA on rooting of 'Kadainou R-1' cuttings is yet to be known. Hence, the aim of this study was to investigate the effects of different concentration of IBA on rooting of hardwood cuttings.

Materials and Methods

Single node hardwood cuttings (~15 cm length) of 'Kadainou R-1' were collected in February 2004 from the University Farm vineyard of Kagawa University, Japan. The collected cuttings were treated with four concentrations of IBA (1, 10, 100 and 1,000 mg/liter). IBA powder was dissolved in small amount of 100% ethanol firstly, and then the solution was diluted to 1, 10 and 100mg/liter with deionized water respectively, but 1,000mg/liter IBA was dissolved in 50% ethanol. Grapevine cuttings soaked in 50% ethanol and tap water were used as controls. The basal ends (~2-3 cm) of the cuttings were dipped in IBA concentrations of 1, 10, 100 mg/liter and tap water for 6 hours and in 1,000 mg/liter IBA and 50% ethanol for 30 seconds. The treated cuttings were allowed to stand for fifteen minutes at room temperature to remove the ethanol from the cut surface. Cuttings thus prepared were planted in a tray (35 cm × 25 cm × 10 cm) containing vermiculite soil. The transplanted cuttings were kept in a plastic house. Irrigation was applied frequently to maintain optimum moisture conditions. Data on rooting percentage, root length, and root numbers were recorded two months after transplantation.

We used 10 cuttings per treatment and each treatment had 3 replications.

Results and Discussion

The addition of IBA enhanced rooting in all concentrations tested except 1 mg/liter (Fig. 1). Indole 3-butyric acid at 100 mg/liter was found to be most effective for the rooting of 'Kadainou R-1' since it gave the highest percentage of rooting (83%) and the longest (71.0 mm) and highest numbers of primary roots (5.84). No rooting was observed with the 50% ethanol treatment. Rooting percentage, root length and primary root numbers increased as the concentration of IBA increased until 100 mg/liter; however, rooting percentage and root length decreased slightly at 1,000 mg/liter of IBA treatment. Indole 3-butyric acid not only induced rooting percentage, but also improved root quality (Fig. 2 to Fig. 3).

The effectiveness of IBA on the hardwood propagation of grapevines as noted in the present study was reported previously by several authors [5,6,7] in many grape genotypes; however, Alley [5] reported that IBA did not improve rooting of St. George, 1613, and AXR #1 rootstocks, suggesting interactions between genotype and exogenous IBA application. Keeley *et al.* [10] reported that rooting percentage increased as the exogenously applied auxin concentration increased in Norton (*V. aestivalis*) hardwood cuttings. Indole 3-butyric

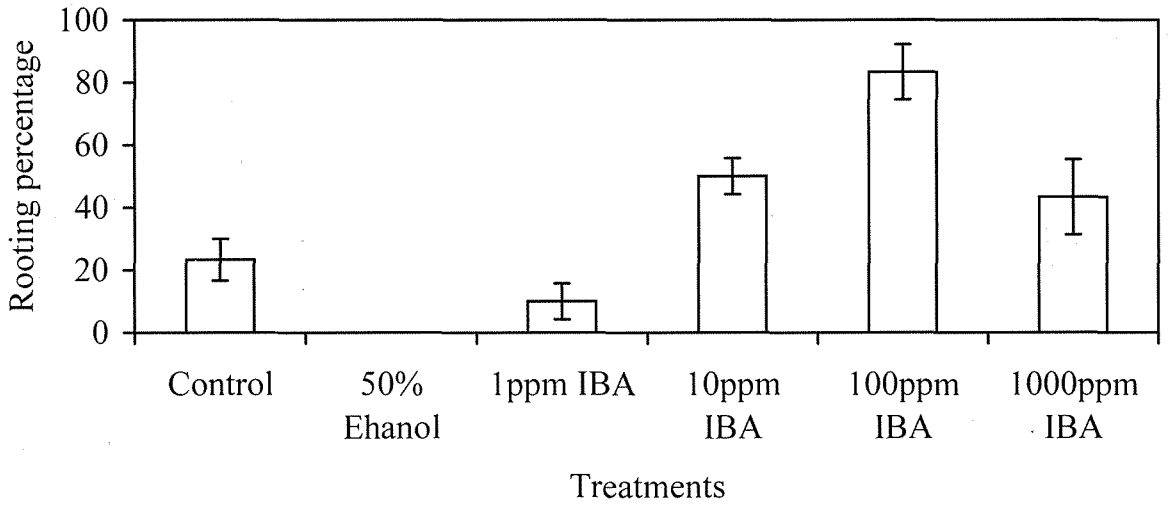

Fig. 1. Rooting percentage of 'Kadainou R-1' hardwood cuttings as influenced by IBA application. Vertical bars represent mean ± standard error.

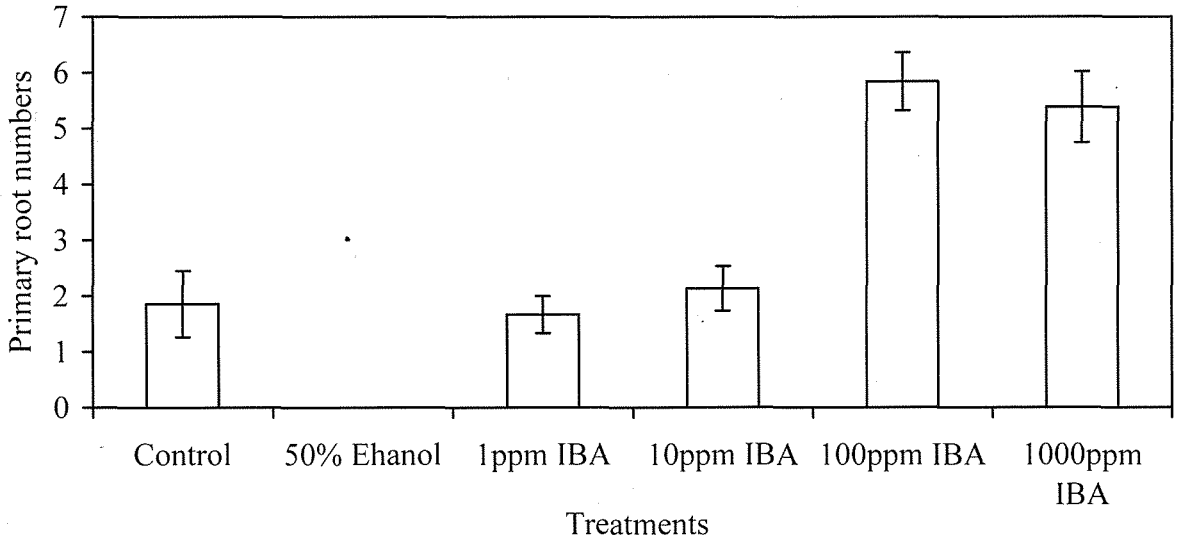

Fig. 2. Primary root numbers of 'Kadainou R-1' cuttings as influenced by IBA application. Vertical bars represent mean ± standard error.

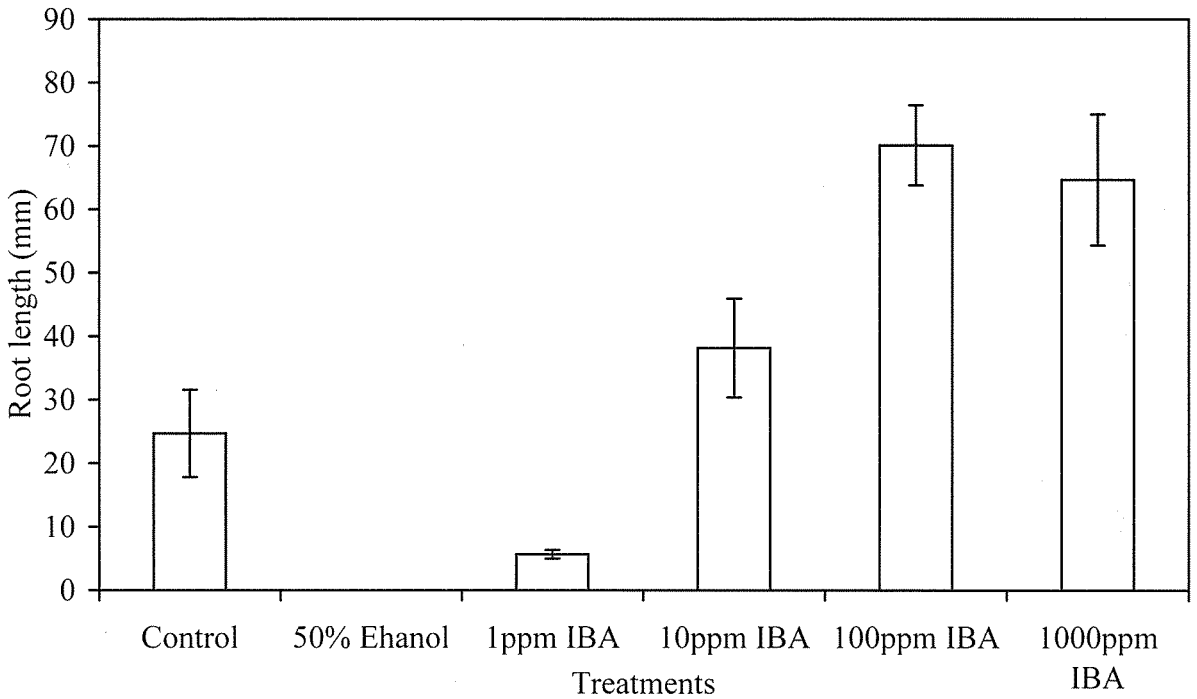

Fig. 3. Length of the longest root of 'Kadaionou R-1' cuttings as influenced by IBA application. Vertical bars represent mean ± standard error.

acid reduces the time required for cuttings to callus and roots to appear [11]. The mechanisms of exogenous IBA application on rooting involve the conversion of IBA into indoleacetic acid (IAA), the most active auxin, in plant tissue [12]. Liu *et al.* [13] reported that the auxin-induced root formation was accompanied by increasing levels of putrescine (polyamines) in soybean hypocotyls explants and suggested that the exogenously applied auxins (IBA and NAA) may act on polyamine synthase and IAA oxidase activity.

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要　　約

ワイン用新品種‘香大農R-1’の挿し木発根に対するインドール酪酸（IBA）の影響を知るため，熟枝を1，10，100，1000mg/literの濃度のIBAで処理した．対照区として50％エタノールと水を用いた．1mg/liter以外の濃度でIBA処理は‘香大農R-1’の発根を促したが，そのうちで100mg/literの濃度で発根率，1次根数，最大根長が最も優れた．