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Effect of Chemicals, Hot Water and Hulling on Breaking Corm Dormancy in Summer-flowering Gladiolus

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夏咲きグラジオラスの球茎の休眠打破に及ぼす化学物質，温とうおよび除皮処理の影響

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Introduction

Effect of chemicals on breaking corm dormancy in summer-flowering gladiolus (*Gladiolus spp.*) has been studied by many researchers.[1-4] In spring-flowering gladiolus (*Gladiolus*× *Tubergenii*) also, various chemicals have been showed to promote sprouting and flowering.[5]

In this report, effect of hot water and hulling treatments as well as chemical treatments on sprouting was investigated with dormant corms in summer-flowering gladiolus. Moreover, effect of their treatments on respiration of corms was discussed.

Materials and Methods

Corms of summer-flowering gladiolus 'Traveler' were dug up from University field 1.5 −2.5 months after flowering. Ten to twelve corms were used per treatment. All the corms were planted at 20°C in moistened perlite for sprouting test after dormancy-breaking treatments.

Chemical treatments. Corms were dug up on Aug. 27 and they were immersed on Aug. 31 in 3% $CaCN_2$ and 1% KCN solution at 30°C for 1 hour. For acetaldehyde vapor treatment, the corms were wrapped with wood-wool soaked with acetaldehyde and sealed at 20°C in a plastic bag for 5 minutes. Control corms were planted direcrly without any treatment. For gas treatments, the corms were kept at 30°C in a desiccator including 100% N_2, 100% CO_2 and 1% CO for 5 days. Control corms were kept in normal air in a desiccator. For ethylene gas treatment, the corms were dug up on Nov. 11, stored at 5°C for 1 month and exposed at 30°C to 1% ethylene in a desiccator for 5 days. Control corms were kept in normal air in a desiccator.

Hot water treatment. Corms were dug up on Aug. 25 and treated with hot water immediately, 15 days or 30 days after dry storage at 5°C. Hot water treatment was conducted by immersing the corms in 46°C water for 1 hour. Control corms were immersed into cold water (23°C) for 1 hour.

Hulling treatment. Corms were dug up on Oct. 16 and hulled completely or partially. For complete hulling, all the scales were totally removed off from the corm body. For

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partial hulling, the upper part of the scales were opened up with the basal parts still attached to the corm body.

Results

Chemical treatments. $CaCN_2$ and KCN promoted sprouting in which 50% sprouting was 14—16 days earlier than that in control (Fig. 1). Acetaldehyde treatment was effective for

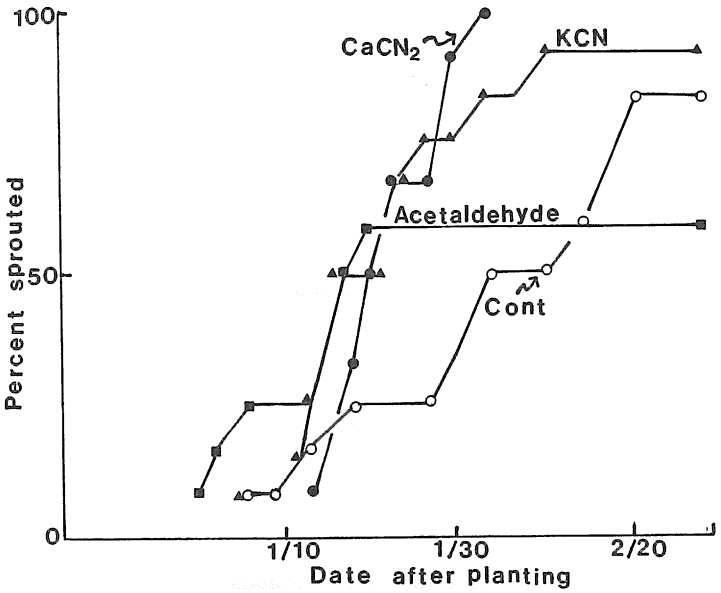

Fig. 1 Effect of 3% $CaCN_2$, 1% KCN and acetaldehyde vapor treatments on sprouting from dormant corms

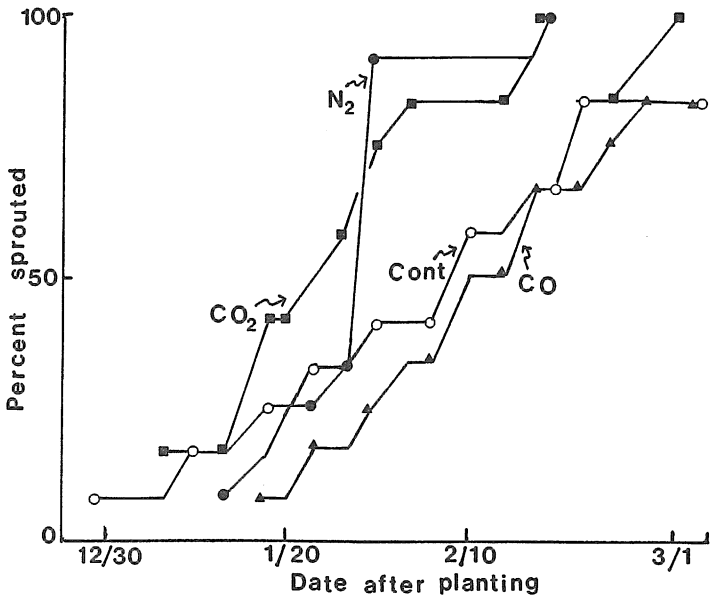

Fig. 2 Effect of 100% N_2, 100% CO_2 and 1% CO treatments on sprouting from dormant corms.

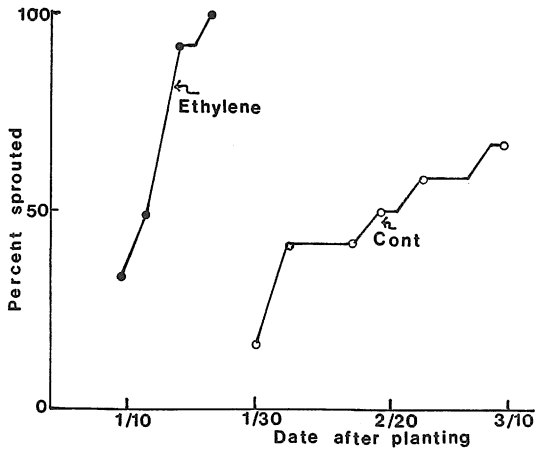

Fig. 3 Effect of 1% ethylene treatment on sprouting from dormant corms with 30 day cold storage.

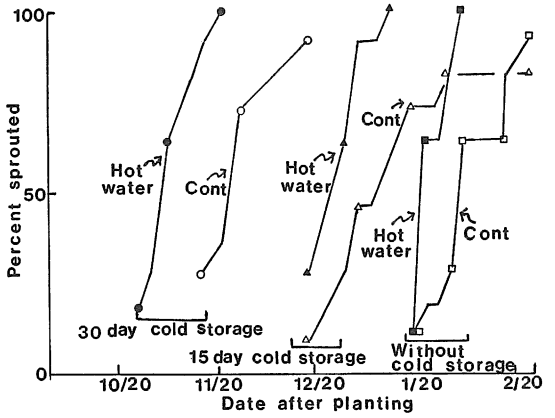

Fig. 4 Effect of hot water treatment on sprouting from dormant corms with or without cold storage.

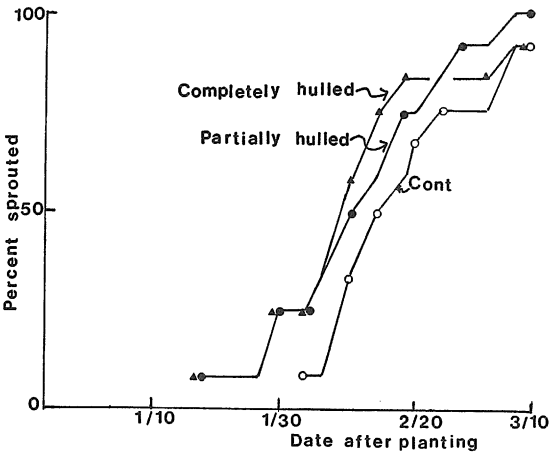

Fig. 5 Effect of hulling on sprouting from dormant corms.

early sprouting but did not surpass 60% sprouting because of high phytotoxicity (Fig. 2). N_2 and CO_2 gases were also effective for sprouting while CO was without effect. C_2H_4 treatment after 30 day cold storage accelerated sprouting considerably (Fig. 3).

Hot water treatment. Hot water treatment promoted sprouting whether the treatment was given with or without cold storage (Fig. 4). Cold storage also promoted sprouting considerably. 50% sprouting was observed only 39 days after planting in hot water treatment with 30 day cold storage.

Hulling treatment. 50% sprouting date was earlier in the order of completely hulled corms, partially hulled corms and intact corms. (Fig. 5). Although hulling promoted sprouting, it took almost 4 months to reach to 50% sprouting

Discussion

As for effect of chemicals on breaking corm dormancy, ethanol vapor was shown to be effective for summer-flowering gladiolus.[4] Ethylene was also effective when treated after 30 day cold storage in this experiment, although it was without effect when treated immediately after digging or after 15 day cold storage.[4] KCN, $CaCN_2$, N_2, CO_2, hot water and hulling treatments also promoted sprouting although their effect was not so great as in spring-flowering gladiolus.[5] Although their action mechanism is still under investgation, it is interesting that most of the treatments are also effective for removal of astringency from persimon fruit.

It is well known that KCN and $CaCN_2$ inhibit respiration. 100% N_2 and CO_2 also inhibit aerobic respiration. In the other hand, hulling, hot water and ethylene treatments increased respiration.[6] However, the detail experiment with ethanol and KCN showed that respiration considerably increased shortly after suppression during their treatments.[6] From these facts, eventual respiration rise seems to relate with interruption of corm dormancy in summer-flowering gladiolus.

Summary

Three percent $CaCN_2$, 1% KCN, 100% N_2 promoted sprouting from dormant corms in summer-flowering gladiolus 'Traveler'. One percent C_2H_4 also promoted sprouting from corms with 30 day cold storage. Hot water and hulling treatments were also effective for promotion of sprouting. However, effect of any treatment was not so great as shown in corms of spring-flowering gladiolus.

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摘　　要

夏咲きグラジオラス 'トラベラ' の球茎の休眠打破には，3%$CaCN_2$，1%KCN，100%CO_2 および 100%N_2 が有効であった．1%C_2H_4 は，球茎を30日間低温貯蔵後，処理すると効果があった．また，温とうや除皮処理も発芽を早めた．しかし，どの処理の休眠打破効果も，春咲きグラジオラスの球茎でみられたほど大きくはなかった．